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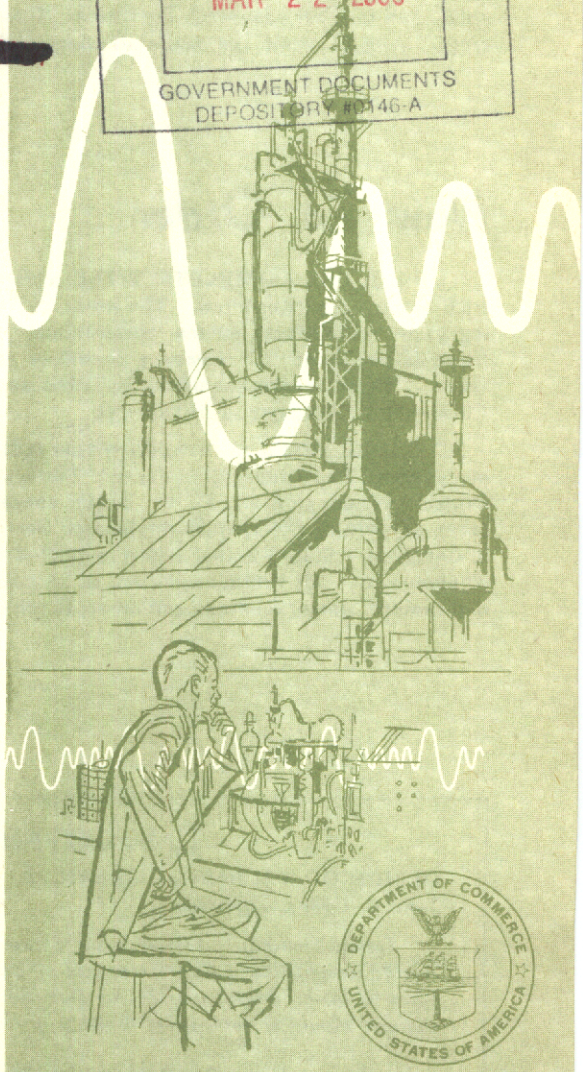

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OFFICE OF TECHNICAL SERVICES
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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

U. S. Government RESEARCH REPORTS

Vol. 27, No. 4 April 12, 1957

Contents

Printed Reports Available from OTS Announced in This Issue

APPAREL

Quantitative investigation of the MA-1 ventilating garment when used with a modified MK-IV anti-exposure suit, by Donald C. Skilling, Joseph W. McCutchan and Craig L. Taylor. California. University. Dept. of Engineering, Los Angeles, Calif. Dec 1956. 39p diagrs, graphs, tables. Order from OTS. $1. PB 121899

The physiological responses of two human subjects have been investigated in thermal environments ranging from 160° to 240°F while wearing the MA-1 ventilating garment, an MK-IV exposure suit, and other garments comprising 2.15 clo of thermal resistance. The ventilating garment was given air inputs ranging from 6 to 14 ft^3 per minute in volume, and from 50° to 90°F in temperature. The thermal responses of the subjects are analyzed in terms of heat storage, body temperatures, heart rates, sweat rates and composite indices of these variables. The results of these experiments have been prepared in terms of predictive equations for the physiological responses as dependent variables and the chamber operative temperature, ventilating air volume, and temperature as independent variables. Tests have also been made of the claim for the MA-1, that thermal protection is afforded up to 165°F ambient temperature, which proves to be justified. AF WADC TR 56-209. AD 110657. Project no. 7155. Covers work from Feb-June 1955 under Contract AF 33(616)-32.

Ventilating system for clothing, by H. A. Mauch, J. F. Hall and F. K. Klemm. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1955. 49p graphs. Order from LC. Mi $3.30, ph $7.80. PB 123936

A system for ventilating Air Force clothing including a water impermeable anti-exposure suit is described. Details of the design and function of this system and its component parts are presented. Principles to be applied in designing insulating and impermeable suits for ventilation are outlined. A new concept for distributing ventilating air over the human body is introduced. Means for supplying ventilating air are discussed, including a small light weight blower developed for this purpose. Provi-

sions to be included in aircraft for the use of this ventilating system are described. Degree of thermal strain was expressed in terms of an index composed of heart rate, sweat rate and rectal temperature rise. A formula is presented which allows the prediction of this strain index or of the body heat storage rate for various stress situations. Project no. 6330. Covers period of work from Aug 1953 to Nov 1954. AF WADC TR 55-152.

CARTOGRAPHY

Comparison of the polar stereographic, gnomonic, and transverse mercator projections for polar aeronautical charts, by A. M. Weber. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jan 1947. 16p diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30.
PB 122260

1. Charts, Aeronautical - Polar projections
2. CAA TDN 42.

Quick-etch process, converting engraved coated vinylite sheets to positives. U. S. Air Force. Aeronautical Chart and Information Center. Air Photographic and Charting Service, St. Louis, Mo. Feb 1955. 17p photos. Order from LC. Mi $2.40, ph $3.30. PB 124689

This report discusses the results of experiments conducted in the conversion of engraved coated vinylite sheets from negative to positive form. The process may be used in place of film positives for addition of names and other stick-up. Quick-etch positives are in many respects more desirable and feasible than the "direct to plate" method for utilizing the engraving medium of coated vinylite. Sample negative included. AF ACIC TR 64.

CHEMICALS AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

Action of sulfonamides on certain fungi pathogenic to man, by Frederick T. Wolf. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jan 1945. 9p photo. Order from LC. Mi $1.80, ph $1.80. PB 124047

1. Sulfonamides - Bactericidal action 2. AF SAM Proj. 346, Report 1.

Atabrine and anoxia tolerance, by Paul K. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Mar 1943. 4p table. Order from LC. Mi $1.80, ph $1.80.
PB 124042

Unclassified 15 Aug 1945.
1. Atabrine - Tolerance 2. Oxygen deficiency - Effect of antimalarial drugs 3. AF SAM Proj. 112, Report 1.

Effect of pressure on the penetration of radioactive penicillin in the teeth of dogs, by Edward C. Wach, J. Donald Hauptfuehrer and Ralph G. Frickenstein. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Apr 1956. 10p photos, tables. Order from LC. Mi $1.80, ph $1.80. PB 123662

There was distribution of radioactive penicillin into the dentinal tubules and into the cancellous bone of the mandible in specimens of all groups handled at ground-level pressures. There was no visible distribution of radioactive material into the supporting structure in specimens which were exposed to decreased pressure. Penetration of the dentinal tubules in vitro was much less than in live dogs. A sufficiently condensed filling placed in the apical portion of a tooth prevents the material from being distributed in the supporting structure. AF SAM R 56-2.

Penetration of S^{35} labeled penicillin in extracted human teeth, by Edward C. Wach, J. Donald Hauptfuehrer and Robert G. Kesel. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Apr 1955. 9p photos, tables. Order from LC. Mi $1.80, ph $1.80. PB 123664

In a study of 14 human teeth, dentin and pulp tissue were found to be permeable to radioactive penicillin. It was further established in one case that the material in the dentin remained in the original form of the penicillin molecule. Further investigation is indicated to prove if the latter is true in all cases. The manifestation of body metabolism must of course also be considered. AF SAM R 56-3.

Toxic effects of prophylactic doses of atabrine, by Paul K. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Aug 1942. 4p. Order from LC. Mi $1.80, ph $1.80.
PB 124039

1. Atabrine - Toxicity 2. Atabrine - Dosage 3. Malaria - Prevention 4. AF SAM Proj. 73, Report 1.

Toxic effects of therapeutic doses of atabrine, by Paul K. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jun 1942. 5p. Order from LC. Mi $1.80, ph $1.80.
PB 124037

1. Atabrine - Toxicity 2. Atabrine - Therapeutic use 3. Atabrine - Dosage 4. Atabrine - Effects 5. Malaria - Prevention 6. AF SAM Proj. 51, Report 1.

Toxicity of mepacrine (British atabrine), by Paul K. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jun 1942. 7p. Order from LC. Mi $1.80, ph $1.80. PB 124038

1. Mepacrine (British atabrine) 2. Atabrine - Toxicity 3. Atabrine - Effects 4. AF SAM Proj. 55, Report 1.

Toxicity of prophylactic doses of atabrine, by Paul K. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jun 1942. 12p. Order from LC. Mi $2.40, ph $3.30. PB 124036

1. Atabrine - Toxicity 2. Atabrine - Dosage 3. Atabrine - Effects 4. Malaria - Prevention 5. Malaria - Therapy - Tests 6. AF SAM Proj. 28, Report 1.

Organic Chemicals

Gamma ray induced addition of bromotrichloromethane to olefins, by A. M. Lovelace and D. A. Rausch. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1956. 14p graph, tables. Order from OTS. 50 cents. PB 121279

A new technique in organic synthesis has been applied to the preparation of intermediates for monomers to be used in the polymerization of new useful fluid plastic and elastomeric material for high temperature applications in military aircraft. The addition of bromotrichloromethane to olefins has been effected with gamma radiation. The well-known free radical addition of bromotrichloromethane to olefins has been studied utilizing cobalt^{60} as the energy source for the generation of free radicals. It has been found that addition reactions can be conducted in this manner resulting in good yields of the simple one to one addition products. In all cases the resulting products were shown to be identical with those reported by other investigators using organic peroxides or ultraviolet light. Using the system of bromotrichloromethane and 1-octane a study of the dependency of yield on radiation dosage was carried out. Project no. 7340, Task no. 73404. Covers period of work from March-June 1955. AF WADC TR 55-461.

Oxidation studies in toluene as a carrier gas, by Lowell G. Tensmeyer, Henry Eyring and George Richard Hill. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Sep 1956. 71p photos, drawings, diagrs, graphs, tables. Order from OTS. $2. PB 121743

The attempt was made to study the initiation reactions of hydrocarbon oxidation by utilizing a toluene carrier-gas technique. A more complex vacuum system adequate for study of the oxidation processes was also described, with suggestions for refinement of equipment for future work. An infrared technique utilizing solid KBr was adapted for the study of combustion products. Chemical titrations were also used for total acids and total peroxides. AD 110-318. Contract AF 33(038)-20839. AF OSR TN 56-503. UU ISRP TR 21.

Preparation of fluorine-containing compounds, by H. C. Brown, R. D. Dresdner, J. A. Wethington, Jr. and J. A. Young. Florida. University, Gainesville, Fla. Nov 1956. 27p tables. Order from OTS. 75 cents. PB 121818

Part of the objective of this program is the preparation or attempted preparation of new fluorine-containing chemical species by the Simon's electrochemical process. The results of numerous operations in a variety of cells are summarized. The preparation, pyrolysis or thermal reactions of certain simple fluorocarbon sulfides with fluorocarbon olefins are described. The sulphides are CF_3SF_5, $C_2F_5SF_5$, $(CF_3)_2SF_4$ and $(C_2F_5)_2SF_4$. The olefins involved were $CF_3CF{=}CF_2$, and $CF_3N{=}CF_2$. The synthesis and properties of fluorocarbon derivatives having hetero atoms such as oxygen or nitrogen in the principal carbon chain of the molecule have been studied. Preparation of a new and unexplored class of compounds, the perfluoroamides, and the synthesis of a possible intermediate in the preparation of the difunctional acid $O(CF_2COOH)_2$ are mentioned. Preparations and reactions of perfluoroalkyl amidines, $R_FC(:NH)NH_2$, and perfluoroalkyl triazines, $(R_FCN)_3$, have been studied. Efforts to use potassium and sodium vapor as a reaction medium for fluorocarbon synthesis have not been successful. Fluorine exchange between metal fluorides and fluorocarbon olefins has been studied. Exchange was generally accompanied by decomposition. It was found that the reactor packing determined the nature of the products obtained from the oxidation of C_3F_6. AD 110493. Project 7340, Task 73404. Summarizes work completed from Jan 1954-May 1956 under Contract Nonr-580(03), NR 356-333. AF WADC TR 56-234.

Role of propylene in the partial oxidation of propane, by C. N. Satterfield and R. C. Reid. Massachusetts Institute of Technology. Dept. of Chemical Engineering. May 1954. 37p diagrs, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123904

The partial oxidation of propane and of mixtures of propane and propylene was studied in order to elucidate the role of propylene in the mechanism of propane oxidation and to aid in the evaluation of the industrial potentialities of such an oxidation process for producing hydrogen peroxide. Division of In-

dustrial Cooperation project 6552. Report no. 46. Contract N5ori-07819, NR 092-008.

Sound dispersion in halo-methane mixtures, by Robert C. Amme and Sam Legvold. Iowa. Engineering Experiment Station, Ames, Iowa and Iowa State University. Dept. of Physics, Iowa City, Iowa. Jan 1956. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122418

Results of studies of the dispersion of ultrasound in mixtures of $CHClF_2$ and CF_4 and of $CHCl_2F$ and $CClF_3$ at various concentrations are presented. In none of the eight mixtures studied is there evidence of multiple dispersion, each mixture exhibiting a single relaxation time which falls between those of the pure constituents. A simple method of averaging the various quantities entering into the prediction of collision lifetimes in the pure constituents is presented which yields lifetimes for the mixtures nearly matching those found by experiment. OSR project no. 37506. Report 319AH. Contract AF 18(600)-1496. AF OSR TN 56-8.

Study of laminar flow phenomena utilizing a doubly refracting liquid. Progress report 3: Rheological properties of aqueous solutions on milling yellow dye, by Edward H. Honeycutt, Jr. and Fred H. Peebles. Tennessee. Engineering Experiment Station, and Tennessee. University. Dept. of Chemical Engineering, Knoxville, Tenn. Aug 1955. 140p photos, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 122941

Aqueous solutions of milling yellow dye exhibit flow double refraction. A research project was initiated to make a quantitative study of this phenomenon, and to develop an optical method of determining the stress distribution in a moving liquid for laminar flow conditions. This thesis describes an experimental study of the viscous properties of aqueous milling yellow solutions. Knowledge of these viscous properties is required in the application of the optical method to liquid stress distribution determination. For Progress report no. 2 see PB 120028. Contract Nonr-811(04).

Plastics and Plasticizers

Copolymers of olefin sulfides, by O. C. Dermer. Oklahoma Agricultural and Mechanical College. Chemistry Dept., Stillwater, Okla. Jun 1956. 50p diagr, graphs, tables. Order from OTS. $1.25. PB 121796

The original objective of this study was to prepare and characterize copolymers containing the units $-CH_2CH_2S-$ or $-CH(CH_3)CH_2S-$. Later it became clear that attention should be given to the process as well as the products, since nothing was known of the kinetics of copolymerizations in which the monomers react by ring scission. This report is therefore divided into three sections. The first describes polymers and copolymers made from ethylene sulfide (ES) or propylene sulfide (PS), chiefly with ethylene oxide (EO). The second tells about indirect preparations of copolymers, i.e., not from monomeric olefin sulfides. Although most five-membered ring compounds do not polymerize, some oxathiolanes, containing the C-C-S-C-O ring, were found to produce as expected, what amounted to copolymers of the olefin sulfides with formaldehyde. Finally the applicability of the copolymer composition equation, developed for vinyl polymerizations, to ionic ring-scission polymerization was tested with olefin sulfides. AD 110496. Project 7340, Task 70317. AF WADC TR 55-447. Contract AF 33(616)-354.

Effect of moisture sorption on weight and dimensional stability of alkyd-isocyanate foam core, by V. C. Setterholm and E. W. Kuenzi. U. S. Forest Products Laboratory, Madison, Wis. Sep 1956. 34p graphs. Order from OTS. $1. PB 121800

Tests were made to determine changes in weight and dimensions of alkyd-isocyanate foam cores subjected to immersion in water and exposure to high humidity for 60 days. Cores of varying densities were investigated. The results indicated that there are differences between alkyd-isocyanate foams that have been foamed in blocks without facings and those that are foamed between two facings to make sandwich constructions. Exposure to high humidity caused increases in weight as high as 4.0 percent and dimensional increases of 0.7 percent. AD 97289. Project 7340, Task 73402. Covers work conducted intermittently from Dec 1953 - Apr 1956 under Contract AF 33(616)-53-20. AF WADC TR 56-86.

Evaluation of glass fabric reinforced plastic laminates, by F. Robert Barnet. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1953. 37p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 124842

A program of evaluation of numerous materials and process variables on the physical, electrical and mechanical properties of glass cloth laminates was undertaken by the Naval Ordnance Laboratory. Included were the variables of fabric weave, yarn weight, fabric finish, type resin, test panel thickness, resin content, and temperature at the time of test. For supplemental report see PB 121277. NAVORD 2669.

Evaluation of low-dielectric glass fabric, by Fred Werren and B. G. Heebink. U. S. Forest Products Laboratory, Madison, Wis. Oct 1956. 24p tables. Order from OTS. 75 cents. PB 121859

Glass-fabric-base plastic laminates, reinforced with fabric made of low-dielectric glass fibers and standard "E" glass fibers, were evaluated on the

basis of mechanical and electrical properties. Six different laminating resins were used. Comparative data obtained from these tests showed that laminates made with low-dielectric fabric were superior in electrical properties but inferior in mechanical properties to comparable laminates made with the standard "E" glass fabric. AD 110459 Project 7340, Task 73400. Work continued intermittently from Aug 1954 - May 1956 under Contract AF DO 33(616)-56-9. AF WADC TR 56-264.

Polymer evaluation handbook, by C. H. Adams, R. J. Bourke, G. B. Jackson and J. R. Taylor. Monsanto Chemical Company. Plastics Division Research Laboratory, Springfield, Mass. Nov 1956. 119p photos, diagrs, graphs, tables. Order from OTS. $3. PB 121870

The Polymer Evaluation Handbook provides a system for obtaining a maximum amount of useful information on small quantities of experimental polymers. It also provides background information on principles of evaluation, properties and measurements and their significance, the nature and behavior of polymers and physical characteristics of plastics in relation to each other and to other classes of materials. The Handbook describes a screening evaluation scheme for effectively and efficiently defining the physical and chemical behavior of small quantities of experimental polymeric materials. The soundness of the evaluation scheme was tested in a pilot laboratory. Examples of the results of these tests are given. Interpretation concepts are discussed which pertain to the appraisal of evaluation information and data. AD 110557. Project 7340, Task 73404. Covers work from Jun 1955-Jun 1956 under Contract AF 33(616)-3034. AF WADC TR 56-399.

Test of formica insulation, by R. B. Owens. U. S. Naval Research Laboratory. May 1935. 6p tables. Order from LC. Mi $1.80, ph $1.80. PB 122804

1. Insulating materials - Formica - Tests 2. NRL R 1153.

Test on the use of plastic models in elastic studies (A study of the aircraft carrier Bent models), by H. B. Maris and J. S. Brock. U. S. Naval Research Laboratory. Nov 1941. 32p photos, diagrs, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 122678

Unclassified.
1. Maxwell-Mohr reciprocal theorem 2. Elasticity - Theory 3. Plastic structures - Stress analysis 4. Plastics - Bending tests 5. Ships - Models - Tests 6. NRL H-1816.

Analysis of Moravian green anti-fouling paint; the individual compounds, the organic material, and the percentage composition, by H. O. Farr, Jr. and L. P. Rankin. U. S. Naval Research Laboratory. Oct 1936. 14p. Order from LC. Mi $2.40, ph $3.30. PB 122696

1. Paints, Anti-fouling - Analysis 2. NRL P-1321.

Method for measuring the corrosion of copper by electrical insulating varnishes, by E. Gerald Meyer, A. Russell Jones, Thomas Coor and Russell W. Sloan. U. S. Naval Research Laboratory. Jan 1945. 14p photos, diagr, graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 123374

1. Insulating varnishes - Tests 2. Copper - Corrosion 3. NRL P 2430.

New materials for restrictive coatings, by Amos Turk. Apr 1945. 4p. Order from LC. Mi $1.80, ph $1.80. PB 123147

OSRD catalog no. 2430.
1. Coatings, Protective - Materials 2. Contract OEMsr 273 3. NDRC Div. 3.

Substitute for aluminum powder in the tinting of zinc chromate primer, by Allen L. Alexander. U. S. Naval Research Laboratory. May 1942. 18p tables. Order from LC. Mi $2.40, ph $3.30. PB 120566

1. Paints, Priming - Zinc chromate 2. Lamp black - Specifications 3. NRL P 1874.

Study of the feasibility of coating magnesium with high-purity aluminum, by C. F. Powell and I. E. Campbell. Battelle Memorial Institute, Columbus, Ohio. Nov 1956. 28p table. Order from OTS. 75 cents. PB 121860

The feasibility of vapor plating magnesium and magnesium-base alloys with aluminum is evaluated on the basis of information available in the literature on volatile aluminum compounds with the stability range required for vapor-plating "atmospheres". Pyrolysis of aluminum alkyls and of aluminum hydride and its derivatives is considered of sufficient interest to warrant experimental investigation. Reduction of aluminum halides with magnesium and disproportionation of aluminum monohalides are considered technically feasible but of lesser interest because the conditions for procuring satisfactory coatings are critical. AD 110512. Project 7351, Task 73514. Covers work from Apr 1 - Jul 31, 1956 under Contract AF 33(616)-3309. AF WADC TR 56-405.

Inorganic Chemicals

Chemical oxygen sources for submarine air purification. Second partial report, by P. Borgstrom. U. S. Naval Research Laboratory. Jul 1936. 13p. Order from LC. Mi $2.40, ph $3.30. PB 122704

1. Submarines - Air - Purification 2. NRL P 1291.

Investigation of dehumidifying agents for submarines and closed spaces in ships, by J. O. Clayton. U. S. Naval Research Laboratory. Order separate parts described below from LC, giving PB number of each part ordered.

Second partial report: Characteristics of magnesium chloride as a desiccant. Jun 1936. 23p graphs, tables. Mi $2.70, ph $4.80. PB 122699

First report issued as P-1234.
1. Submarines - Humidity control 2. Desiccants, Magnesium chloride - Tests 3. Magnesium chloride - Dehumidifying properties 4. NRL P-1277.

Quicklime (calcium oxide) as a desiccant. Jun 1936. 12p tables. Mi $2.40, ph $3.30. PB 122700

1. Submarines - Humidity control 2. Desiccants, Calcium oxide - Tests 3. Calcium oxide - Dehumidifying properties 4. Calcium chloride - Dehumidifying properties 5. NRL P-1278.

Preparation of uranium hexafluoride, by R. R. Miller, W. C. Lanning and Thomas D. O'Brien. U. S. Naval Research Laboratory. May 1941. 13p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122682

Unclassified 23 Apr 1947.
1. Uranium fluorides - Preparation 2. NRL P-1744.

Analytical Chemistry

Analytical procedure for estimation of CN and DM from grenade dessemination (U), by James J. Harris. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Jan 1956. 15p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 122592

An analytical technique has been developed whereby CN and DM can be determined in the presence of each other without serious interferences. CN was determined with reagents M-dinitrobenzene and sodium hydroxide. DM was determined by measuring the absorption at 348 mu. DM and diphenylamine did not interfere with the CN analysis. CN interfered only slightly with the DM absorption. However, the interference could be accounted for and corrected. Project 4-08-04-011-01, Interim report. CC CRL R 579.

Research and development of methods of chemical analysis for titanium metal and alloys, by Henry Suss, Gregory Pantchenko, Anna Aronson, Doris Sutton. Sam Tour & Co., Inc., New York, N. Y. Mar 1953. 140p graph, tables. Order from LC. Mi $6.90, ph $21.30. PB 123149

This report covers the status of methods of analysis for 29 elements in titanium metal and titanium alloys. Report 10013. Project 2284. Rad proj. TB4-150. WAL R 401/48/A-21. Contract DA-069-ORD-800, Final technical report.

Research consisting of spectrographic analysis of samples and development of spectrographic methods for the determination of impurities in pure silicon. Fourth quarterly progress report for the period Feb 1956-Apr 1956 inclusive under Contract AF 19(604)-1416, by James M. Morris. Metal Hydrides Inc., Beverly, Mass. May 1956. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123910

Three general procedures have been developed for the spectrochemical analysis of silicon and silicon compounds. The first method consisted of the conversion of the sample to the oxide form and excitation of the solution by means of the graphite spark resulted in very high sensitivity. Metal standards were prepared and techniques for the direct excitation of the metal were developed. The copper spark method and subsequently the graphite spark were considered to hold the greatest promise for absolute sensitivity where the size of the sample is such that separation techniques may be employed and concentration of the impurities may be achieved. This approach has been outlined in this report. The excellent sensitivities obtained by this method indicate that where it is feasible to adequately perform the chemical separations with the sample that this is the best approach to the spectrochemical analysis of high purity silicon. For 1st-2d quarterly reports see PB 119576 and 120227. AF CRC TN 56-571.

Research on paramagnetic resonance absorption. Terminal report under Contract N6 ori-02033, Task Order no. 33 for the period 15 Feb 1951 - 14 Feb 1954, Extension, 14 Feb 1954 - 14 Jun 1954, by Clyde A. Hutchison, Jr. Chicago. University, Chicago, Ill. Jun 1954. 11p. Order from LC. Mi $2.40, ph $3.30. PB 123025

Problems investigated were: 1. Solutions of alkali metals in liquid ammonia, with special attention to the determination of intensities of absorption; 2. Detection of organic free radicals; 3. Paramagnetic resonance absorption in additively colored crystals;

4. Nuclear hyperfine structure in organic free radicals; 5. Paramagnetic resonance absorption in salts of V and Mn; 6. Paramagnetic resonance absorption in f electron systems. Contract N6 ori-02033, T. O. 33, Terminal report.

Scintillation phenomena in NaI and CsF, by Wesley J. Van Sciver. Stanford University. W. W. Hansen Laboratories of Physics. High-Energy Physics Laboratory, Stanford, Calif. Apr 1955. 128p diagrs, graphs. Order from LC. Mi $6.30, ph $19.80. PB 124096

Thesis - Stanford University. Technical report under Linear Electron Accelerator Project.
1. Cesium iodide - Spectrographic analysis
2. Sodium iodide - Spectrographic analysis
3. Cesium fluoride - Spectrographic analysis
4. Detectors, Scintillation - Performance 5. Contract N6 onr-25116, NR 022-026 6. SU HEPL 38.

Separation of lead, cadmium, and germanium sulfides from zinc sulfide concentrates, by H. Kenworthy and J. S. Absalom. U. S. Bureau of Mines. May 1952. 17p diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123213

1. Zinc - Purification 2. Lead sulfide - Recovery 3. Cadmium sulfide - Recovery 4. Germanium sulfide - Recovery 5. BM RI 4876.

Spectroscopic determination of various functional groups present in aviation gasoline, by J. A. Sanderson and D. L. Cook. U. S. Naval Research Laboratory. Dec 1938. 33p photos, graphs, table. Order from LC. Mi $3, ph $6.30. PB 123298

For Report no. P-1499, describing the solutions used, see PB 123295.
1. Fuels, Aviation - Spectrographic analysis
2. NRL P 1500.

Miscellaneous Chemicals

Hydrides and borohydrides of light weight elements and related compounds. Annual technical report for the period Aug 1, 1954-Jul 31, 1955 under Contract N6 ori-20, T. O. 10, NR 356-255, by H. I. Schlesinger, Grant Urry, in cooperation with A. Finch, J. Frey, W. Henle, L. Hohnstedt, J. Kerrigan, J. Murib and T. Parsons. Chicago. University, Chicago, Ill. Aug 1955. 50p tables. Order from LC. Mi $3.30, ph $7.80. PB 122939

The year 1954-1955 saw chiefly a continuation of work previously begun. A large amount of time was devoted to the study of the reactions of B_2Cl_4 with olefins and cyclic hydrocarbons. An interesting development was the discovery of the marked contrast between the behavior of simple olefines and the behavior of olefines in which one or more hydrogen atoms have been replaced by halogens. It was also discovered that the effect of the halogen atoms seems much less pronounced if they are separated from the double bond by an intermediate carbon atom. Somewhat similar is the preparation of B_2F_4 and the replacement of chlorine by fluorine in the compound $(Cl_2B)_2C_2H_4$. Much time was devoted to the behavior of lithium toward B_5H_9. AD 71122. For earlier reports see PB 109214, 109541, 111421 and 117823.

Study of ultra high temperatures: The combustion of carbon subnitride, C_4N_2, and a chemical method for the production of continuous temperatures in the range of 5000-6000° Kelvin or 9000-11000° Rankine, by A. V. Grosse and A. D. Kirshenbaum. Temple University. Research Institute, Philadelphia, Pa. Dec 1955. 41p photo, graphs, tables. Order from OTS. $1.25. PB 121074

In this method carbon subnitride or dicyano acetylene, C_4N_2 is combusted with oxygen or ozone (or their mixtures) to CO and N_2. At present a temperature of approximately 5260°K. was reached. This is the highest continuous temperature attained so far by chemical means. Project no. 7-7968. AF OSR TN 56-13. Contract AF 18(600)-1475, Technical note no. 1.

Theoretical discussion of the conditions necessary for chemiluminescence, by John C. Polanyi. Princeton University. James Forrestal Research Center, Princeton, N. J. Feb 1956. 11p. Order from LC. Mi $2.40, ph $3.30. PB 124309

The conditions necessary for chemiluminescence are discussed for an atomic reaction $A + BC \rightarrow AB + C$. A method is outlined by which it should be possible to calculate the expected light yield for a reaction of this type. AF OSR TN 56-93. PU FRC TN 21. Contract AF 33(038)-23976.

ELECTRICAL MACHINERY

Electronics

Airborne TACAN distance-measuring equipment, by N. Jeffers. Federal Telecommunication Laboratories, Nutley, N. J. Oct 1956. 60p photo, diagrs (part fold). Order from LC. Mi $3.60, ph $9.30. PB 124084

Technical memorandum 608.
1. Distance measuring equipment 2. TACAN (Tactical air navigation system) 3. Circuits, Range.

Algebraic topology of networks with application to potentiometer analog circuits. Part I: Theory, by Lorenzo Calabi. Parke Mathematical Laboratories, Inc., Concord, Mass. Feb 1956. 115p diagrs (1 fold), tables (part fold). Order from LC. Mi $6, ph $18.30. PB 124510

Algebraic topology is that branch of modern mathematics that may be considered as created by Kirchhoff for the purpose of studying electrical networks. The problem of the present study is to find a network of fixed resistors and ganged linear potentiometers which, between three terminals, will divide a voltage proportionally to an arbitrarily given function of angle of turn. Contract AF 19-(604)-1399, Technical report 1. AF CRC TN 56-173.

Analysis of angular accuracy in search radar, by Robert Bernstein. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. May 1955. 173p photos (part fold), diagrs, graphs, tables. Order from LC. Mi $8.10, ph $27.30. PB 123399

The determination of the angular position of a target with search radar data is treated as a problem in estimating statistically the value of a parameter of a population. A computer was constructed in the form of a simulator which duplicates the entire search radar process in real time and produces an output whose characteristics are the same as those of an actual radar receiving echoes from a flying target. An estimator which can be implemented in a practical situation is applied to the simulator output. The distribution of this estimator is found for various values of the radar system parameters. CUN ERL TR T-1/128. AF CRC TN 56-361. Contract AF 30(635)-2815, T. O. IV.

Antenna pattern measurements on USS AUBURN (AGC-10). Coordinator-Martin Katzin, Consultant Group. U. S. Naval Research Laboratory. Jan 1945. 69p diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123241

Unclassified 15 Dec 1953.
1. AGC-10 (Antenna) 2. Antennas, Shipborne - Radiation patterns - Measurement 3. NRL R 2437.

Application of higher cavity resonance modes to the measurement of free electron densities and diffusion coefficients, by K. S. W. Champion, A. B. de St. Maurice, M. A. Levine and J. K. Fish. Tufts University. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Dec 1955. 31p photos, diagr, graph. Order from LC. Mi $3, ph $6.30. PB 123181

For the measurements described in this report, using a long cylindrical cavity, the TE_{119} mode was chosen. This mode was chosen both because the electric field had a suitable configuration and because the resonant frequency lay in a range that could be readily measured, being well separated from other modes. Electron densities and diffusion coefficients in the afterglows of hydrogen discharges have been measured and the results are presented. Contract AF 19(604)-1040, Scientific report no. 1.

Capacity of the electrical double layer at metal electrodes, by Norman Hackerman, and Ralph J. Brodd. Texas. University. Dept. of Chemistry, Austin, Texas. Aug 1955. 32p photos, drawing, diagr, tables. Order from LC. Mi $3, ph $6.30. PB 123020

The relationship between polarization capacity, by charging curves, and the gas adsorption surface area, by Kr adsorption, were determined for the following metals: Pt, Ni, Cr, Fe, Ta, Al, Cu, and Pb. Contract Nonr-375(02).

Choice of wavelength and characteristic parameters in the design of linear electron accelerators, by E. L. Chu and E. L. Ginzton. Stanford University. W. W. Hansen Laboratories of Physics, Microwave Laboratory, Stanford, Calif. Sep 1955. 80p graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 123972

This report discusses the linear electron accelerator design with particular emphasis on the choice of operating wavelength (λ). Only one type of accelerator structure, the disk-loaded waveguide, is considered, but the principles discussed can be applied to other structure types as well. A set of criteria is described for the evaluation or comparison of different accelerator designs. Detailed analysis and design curves are given in separate appendices. Appendix A discusses the shunt impedance and related characteristics, B beam loading, and C the characteristic derivatives for determining dimensional tolerances. SU ML 274. Contract N onr-225(06), NR 022-166.

Design of A-C filter networks using choppers, by Gardner Sloan. Massachusetts Institute of Technology. Instrumentation Laboratory. Jul 1955. 10p diagrs. Order from LC. Mi $1.80, ph $1.80. PB 123748

DIC project 52-115. AD 70518.
1. Networks - Filters - Theory 2. Networks, Electrical - Design 3. Circuits, Electric - Theory 4. Filters, Electric - Theory 5. Contract AF 33-(616)-2039 6. MIT IL E 470.

Design of a 500-foot-diameter faceted paraboloidal antenna, by W. R. Ferris. U. S. Naval Research Laboratory. Jan 1957. 8p diagr, graph. Order from OTS. 50 cents. PB 121745

An inexpensive design for a fixed paraboloidal antenna of approximately 500 feet in diameter would consist of an array of telephone poles of appropriate lengths supporting flat panels of a size easily con-

structed from commercial timbers or structural steel beams and covered with hardware cloth. The panels might be approximately twenty feet in the longest dimension. For economy of material approximately square panels are desired. The mathematical analysis demonstrates that an antenna suitable for a minimum wavelength of sixteen centimeters would require approximately ninety panels of this size in each of twelve rings. NRL R 4881.

Development of an improved ultra-high-frequency radio fan marker, by P. D. McKeel, J. M. Lee, and H. J. Metz. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jul 1938. 21p photos, drawings, diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 122276

Originally printed in July 1938 as Report no. 11, Safety and Planning Division, Bureau of Air Commerce. Reprinted by the Civil Aeronautics Authority, 1941. For basic development see CAA TDR 5.
1. Antennas, Fanned beam - Design 2. Antennas, Fanned beam - Radiation patterns 3. CAA TDR no. 12.

Development of components for x_b frequency band, by A. H. Ryan. U. S. Naval Research Laboratory. Jan 1946. 48p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 123351

Unclassified 15 Dec 1953.
1. Radar - Bands X 2. Radar - Components - Tests 3. Radar - Receivers - Tests 4. Wave guides, Circular - Tests 5. Radar - Components - Testing equipment 6. Radar - Transmitters - Tests 7. NRL R 2716.

Double curvature reflectors for beam shaping with quasi-point-source feed, by A. E. Marston. U. S. Naval Research Laboratory. May 1952. 12p photo, diagrs, graph. Order from LC. Mi $2.40, ph $3.30. PB 124258

Techniques based on geometrical optics are used to develop design formulae for doubly curved reflectors which will give radiation beams of a prescribed shape when employed with certain primary feeds. The quasi-point-source feed considered here is encountered in horns fed by rectangular waveguide and flared in either the E-plane or the H-plane but not in both simultaneously. Tests on a reflector designed using these formulae gave results which agreed well with those calculated. NRL R 3981.

Engineering aspects of diode amplification, by C. G. Dorn. U. S. Naval Ordnance Laboratory. Computer Components Division, Corona, Calif. Jul 1956. 18p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 124644

This report has been written as an aid in the understanding of the process of amplification in diodes and of the physical properties that have a bearing on such amplification; it shows the dependency of diode amplification on postconduction phenomena. Typical waveforms of amplification are shown. These waveforms show no apparent advantages over present components and add considerable difficulty in application. NAVORD 4577. NOLC R 328.

Field emission from metals into alkali halide crystals, by M. Geller. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Mass. Oct 1955. 33p diagrs, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123733

The transient photocurrents associated with the movement of photoelectrons in additively colored alkali halide crystals, and the accompanying growth of positive space charge at the cathode leading to field emission, has been previously calculated and verified by room temperature measurements. These experiments have been extended to low temperatures and the theory has been expanded to include the final photocurrents produced by the space-charge enhanced field. Based on a thesis. Research supported jointly by the Navy Dept., the Army Signal Corps and the Air Force under Contract N5 ori-07801, NR 011-421. MIT LIR TR 100.

Field theory of traveling-wave tubes with application to the study of attenuator saturation effects, by William Buchman. California Institute of Technology. Electron Tube and Microwave Laboratory, Pasadena, Calif. Aug 1955. 136p drawing, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 123173

Propagation constants have been calculated for a lossy traveling-wave tube by means of a field theory. These results have been applied to the prediction of an attenuator power loss of the order of 2 or 3 db. compared to attenuatorless operation. It is shown that the gain of the higher order modes is negligible. Admittance matching by means of radial admittance transformation is the underlying method used throughout. The Pierce-Fletcher theory in common use at this time is examined in some detail to determine its range of validity. The effects of space charge bunching on saturation has been treated. Criteria have been set for determining whether bunching is important or not in determining saturation. Technical report 2. Contract Nonr-220(13).

Government electronics research, a bibliography of research reports released through the Office of Technical Services, January - December 1956. U. S. Office of Technical Services. Feb 1957. 50p. Order from OTS. $1.50. PB 121779

1. Electronics - Research - Bibliography.

Height-gain of scatter antennas, by Noel Stone. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Propagation Laboratory, Bedford, Mass. Feb 1956. 14p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 123078

The gain of antenna is maximized as a function of height and physical orientation when the incident-wave field is of a statistical type describable by correlations normal ρ_n and parallel ρ_p to the wave direction. The wave is assumed to be incident at some angle specified as δ. AF CRC TR 56-103.

Interaction of electrons and R-F fields. Current status of the noise analysis, Technical report no. 4 covering the period 1 Dec 1954-1 Jul 1955 under Contract Nonr 1147-01, by J. C. Twombly. Colorado. Engineering Experiment Station, Boulder, Colo. Jul 1955. 52p drawings, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 123057

This report deals largely with investigation of discrete oscillations and excess noise noted in a low voltage beam tube employing an axial focusing magnetic field. A general description of this tube type and the principle of its operation may be found in Technical Report No. 1 of this series. A diagram of the experimental tube used thus far for most of the noise studies is here reproduced. For reports no. 1 and no. 3 see PB 115243 and PB 119838. Contract Nonr-1147-01, Technical report no. 4.

Investigation of methods of producing single crystals of non-metallic ferromagnetic substances. Third quarterly report for the period 1 Jan-31 Mar 1956 under Contract AF 19(604)-1419, by James Koenig. Clevite Research Center, Cleveland, Ohio. Apr 1956. 24p photos, drawing. Order from LC. Mi $2.70, ph $4.80. PB 123450

Two diffusion experiments were carried out by placing nickelous and ferric oxide pellets, ammonium chloride solution, and a ferrite seed in a closed silver tube which in turn was housed in an autoclave. These runs were conducted at about 475°C and at 16,000 and 20,000 psi. Growth on the seed crystal was moderate in the run at the lower pressure and shorter duration and substantial, with 120 percent weight gain, at the higher pressure and longer duration. A hydrothermal system which consisted of magnetite and ammonium chloride solution at about 450°C and 20,000 psi, and which was bled at the rate of two drops per hour, yielded a nearly stoichiometric magnetite disc composed of single crystal grains up to 1/8 inch across. Investigations were extended to systems with solutions of ammonium bromide and iodide, and their mixtures and combinations with ammonium chloride. They all transferred magnetite hydrothermally but produced excessive spontaneous crystallization. The solution of ammonium bromide and iodide yielded particularly well-shaped octahedral magnetite crystals, many over 1 mm large. AF CRC TN 56-370. Contract AF 19(604)-1419, Quarterly report no. 3.

Investigation of the feasibility of using a short solenoid as an electromagnetic accelerator, by Morris M. Christensen, Howard K. Okamoto and William S. Partridge. Utah. University. Dept. of Electrical Engineering, Salt Lake City, Utah. Jun 1956. 38p photos, diagrs, tables. Order from LC. Mi $3, ph $6.30. PB 123981

AD 87530. Technical report OSR-4.
1. Solenoids, Firing - Performance 2. Solenoids, Firing - Tests 3. Accelerators, Electronic - Magnetic fields 4. Projectiles - Velocities - Measurement 5. Contract AF 18(600)-1217, Technical report no. 4. 6. AF OSR TN 56-214.

Ionosphere propagation studies. Scientific report no. 1-2, for the period Sep 1-Nov 30, 1955 under Contract AF 19(604)-1413, by Leonard C. Edwards. Raytheon Manufacturing Co., Wayland, Mass. Dec 1955. 55p photos, diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123408

Some calculations have been made to reveal the effect of antenna directivity on the theoretical back-scatter patterns which were derived on contract AF 19(604)-712. Plans have been made to check the focusing factor-back-scatter relation used in earlier work by deriving a new focusing factor curve from measurements of field strength in the vicinity of the skip distance. The complete instrumentation of this program, which was described in detail in the first quarterly report, has been accomplished. Beacon equipment operating on 12 and 16 mc was installed at Fulton, Missouri and some data was collected and analyzed. Little usable data was obtained on 16 mc beacon equipment. The 12 mc beacon operated satisfactorily and the data collected on this frequency provided useful information. For report no. 1-1 see PB 122350. Appendix: Some ionosphere scatter techniques, by D. A. Hedlund, L. C. Edwards and W. A. Whitcraft, Jr. (Presented at Scatter Symposium, Washington, D. C., Nov 15, 1955). AF CRC TN 56-166.

Linear-phase electric filters, by Byron J. Bennett. Stanford University. Electronics Research Laboratory, Stanford, Calif. Feb 1952. 222f diagrs, graphs. Order from LC. Mi $9.90, enl pr $36.30. PB 124652

This report presents (1) a general image-parameter method for linear-phase electric filter design and (2) a general insertion-loss method for design of electric filters possessing prescribed phase characteristics. Use is made of the electrostatic potential analogue in both methods. A simple method, using a Padé approximant, is introduced to obtain the insertion-loss characteristic from the image-parameter characteristic. SU ERL TR 43.

Meteor trails as reflectors of radio waves: Interpretation in terms of high frequency radar, by R. B. Banerji. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Dec 1955. 54p diagrs, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 122357

The theory of the formation of meteor trails is reviewed qualitatively and certain relevant quantitative features discussed. On this basis the phenomena of reflection and scattering from such trails is considered in detail. The number of meteor echoes that can be expected in a typical radar system is calculated under search and tracking conditions. The preferred direction of observation of meteor showers by a radio equipment is worked out for different showers. Echo duration and range distribution are also determined. AF CRC TN 55-1051. PSC IRL SR 80. Contract AF 19(604)-1304.

Near-zone fields of paraboloid reflectors, by Duane G. Dalley. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. Oct 1955. 80p diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 123426

1. Antennas, Paraboloid - Radiation patterns 2. Radar - Reflectors - Radiation patterns 3. Aberration, Optical - Theory 4. Geometry, Optical - Theory 5. Contract N7 onr-29529, Report 49 6. UC IER Ser. 60, Issue 148.

On the representation of electromagnetic fields by Debye potentials, by Calvin H. Wilcox. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Bedford, Mass. Jul 1955. 17p. Order from LC. Mi $2.40, ph $3.30. PB 123402

This paper discusses the question as to what class of electromagnetic fields can be represented by Debye potentials. The principal finding is that an arbitrary electromagnetic field, defined in a region $a < r < b$ relative to a system of spherical coordinates (r, θ, ϕ), can be respresented by a pair of Debye potentials associated with this coordinate system. AF CRC TR 55-117.

Performance of the 580-600 megacycle slot antenna for the Aerobee rocket, by Howard J. Jackson, Harold D. Smith and Cecil C. Post. New Mexico College of Agriculture and Mechanic Arts. Physical Science Laboratory, State College, New Mex. Feb 1956. 20p photos, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 123163

Antenna pattern measurements for the 580-600 Mc/sec 3-slot array antenna were made on a section of the Aerobee rocket. Measurements were made in the principal planes through the center of each slot. Measurements of the transmission loss and phase characteristics of the 3-slot array antenna feed harness were made. Transmission loss was found to be 0.5 db, $\pm$0.2 db per section, and the relative phase difference at the output of each section was found to be not greater than $\pm$2 degrees. Voltage standing wave ratio measurements were taken on each slot and its associated feed harness, as well as on the complete 3-slot array. Scientific report 3. AF CRC TN 56-458. Contract AF 19(604)-409.

Phase centers of electromagnetic horns. Final report, under Contract AF 30(604)-926, by Yueh-Ying Hu. Syracuse University. Research Institute. Electrical Engineering Dept., Syracuse, N. Y. Sep 1954. 91p photos, diagrs, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 124554

One important application of the electromagnetic horn is its use as the primary feed for paraboloidal reflectors. In such application it is important to have uniform phase distribution along the reflector aperture. By the geometry of the reflector it is required that the feed is a point source located at the focus. It is obvious that an electromagnetic horn is not a point source, but it can be designed such that it acts as a point source with respect to the reflector. AD 71402. Covers period of work from Jun 1952-Sep 1954. AF RADC TR 55-336.

Propagation factors affecting the interference due to ionospheric scatter circuits, by N. Stone, P. J. Nawrocki and D. F. Winter. U. S. Air Force. Air Research and Development Command. Electronic Research Directorate. Propagation Laboratory, Bedford, Mass. May 1956. 75p map, diagrs, graphs (part fold), tables. Order from LC. Mi $4.50, ph $12.30. PB 123419

1. Waves, Electromagnetic - Propagation - Ionosphere 2. Waves, Electromagnetic - Interference - Theory 3. Ionosphere, E-layer - Radio propagation 5. AF ERD CRRK TM 55-100.

Properties of the asymmetric dipole, by Irene Carswell. Stanford Research Institute, Menlo Park, Calif. Dec 1955. 67p drawing, diagrs (part fold), graphs. Order from LC. Mi $3.90, ph $10.80. PB 123978

This report describes an experimental investigation of asymmetrically-fed cylindrical antennas. Radiation pattern and input impedance data are presented for a wide range of antenna parameters. The measured data are compared with data computed from several analytical expressions found in the literature and the usefulness of these expressions is discussed. SRI TR 52. AF CRC TN 56-179. Contract AF 19(604)-1296.

Quarterly progress report no. 3, for the period 15 Jan-14 Apr 1956 under Contract AF 18(600)-1505, by Ernst Weber. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. May 1956. 31p diagrs, graph. Order from LC. Mi $3, ph $6.30. PB 123157

Lists publications, papers, reports resulting from this contract, and summarizes research on nonlinear electrodynamics; fundamental electrodynamics including microwave properties of germanium; and information processes, including distributed parameter network theory, time varying active networks, and information networks. For 1st report see PB 119553. PIB R 452.3-56.

Radiation characteristics of rectangular surface sources, by A. I. Mahan. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1953. 57p diagrs, graph. Order from LC. Mi $3.60, ph $9.30. PB 124841

A theoretical study of the radiation characteristics of rectangular surface sources has been made when these sources radiate uniformly over their surfaces and obey Lambert's Cosine Law. This study includes a presentation of the history of the development of such formulae up to the present. Presented in part at the 38th annual meeting of the Optical Society of America in Rochester, N. Y., Oct 15-17, 1953. NAVORD 2980.

Regularly observable aspect-sensitive radio reflections from ionization aligned with the earth's magnetic field and located within the ionospheric layers at middle latitudes, by A. M. Peterson, O. G. Villard, Jr., R. L. Leadabrand and P. B. Gallagher. Stanford University. Radio Propagation Laboratory, Stanford, Calif. Sep 1955. 29p photos, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 123986

1. Ionosphere - E-layer - Radio propagation
2. Ionosphere - F-layer - Radio propatation
3. Radio - Noises - Sources 4. Radio waves - Echoes 5. Radio waves - Scattering - Ionosphere
6. Contract N6 onr-(07), NR 373-360 7. Contract DA-04-200-ORD-181 8. SU RPL TR 93.

Report on preliminary model GP-1 equipment, by J. C. Link and M. H. Schrenk. U. S. Naval Research Laboratory. May 1936. 111p photos, diagrs, graphs, tables. Order from LC. Mi $6, ph $18.30. PB 122698

1. GP-1 (Radio transmitting equipment) 2. Radio transmitters - Tests 3. NRL R 1272.

Research investigation directed toward extending the useful range of the electromagnetic spectrum. Columbia University. Radiation Laboratory, New York, N. Y. Contract DA 36-039-sc-64630. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. Order separate parts described below from LC, giving PB number of each part ordered.

Second quarterly progress report for period 16 Mar 1956 through 15 Jun 1956, by P. Kusch. Jun 1956. 44p diagrs, graphs, tables. Mi $3.30, ph $7.80. PB 123757

Reports research for the period on: I. Generation of high frequencies. II. Microwave apparatus and techniques. III. Tube fabrication techniques. IV. Microwave physics, including magnetic resonance at millimeter wavelengths and microwave spectrum of CH_3I.

Special technical report: Development of a tunable CW magnetron in the K-band region, by Zeev Fraenkel. Jun 1956. 57p diagrs, graphs, tables. Mi $3.60, ph $9.30. PB 123756

The development of a low field, K-band, tunable CW magnetron is described. The major characteristics of the device are presented and compared to the characteristics of other K-band magnetrons. The research leading towards the development of the magnetron is outlined. This research program had two major objectives: (a) the study of cathode back-bombardment in CW magnetrons, (b) the study of low field operation. CU-3-56 SC 64630.

Resonance phenomena at microwave frequencies in gyromagnetic gaseous discharge plasma, by M. Gilden and I. Goldstein. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Feb 1956. 107p photos, diagrs, graphs. Order from LC. Mi $5.70, ph $16.80. PB 123412

The object of this work was to investigate resonance phenomena at microwave frequencies in gyromagnetic gaseous discharge plasmas. In particular, decaying rare-gas discharge plasmas in the presence of a magnetic field were studied at microwave frequencies of about 10,000 megacycles per second. Emphasis was placed upon the intrinsic properties of the medium which are associated with the cyclotron resonance of free electrons. Project 4156. Task 46310. AF CRC TN 56-177. ILU EES TR 9. Contract AF 19(604)-524.

Semiconductor research. Semi quarterly report no. 10, Apr - Jun 1955 under Contract N6-onr-24914. Pennsylvania. University. Department of Physics, Philadelphia, Pa. Jul 1955. 270p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 124172

Chapters 5-8 are abstracts of theses prepared during period covered by this report. Contents: - 1. Photocurrent decay time in tellurium, by David Redfield. - 2. Sensitization of potassium chloride crystal to x-ray coloration, by Lan-Ying Lin. - 3. Effects of heating in air on the Hall coefficient of tellurium, by Donald Long. - 4. Pressure dependence of resistivity of Mg_2Sn, by Donald Long. - 5. De-

pendence of dielectric constant on density of aggregates, by Robert S. Smith. - 6. Change of length of ionic crystals due to X-ray irradiation, by Lang-Ying Lin. - 7. Chemisorption, photoconductivity, and photodesorption in zinc oxide, by David B. Medved. - 8. Measurements of the complex dielectric constant and Faraday rotation in semiconductors at microwave frequencies, by Richard R. Rau.

Simulation study for period 1 Nov 1955-31 Jan 1956. Report no. 1 under Contract AF 19(604)-1572. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Feb 1956. 72p diagrs (part fold), graphs. Order from LC. Mi $4.50, ph $12.30. PB 123416

The simulation program as outlined in the basic contract includes the development of a digital multi-target radar simulator of high realism and precision, and the further improvement and extension of an existing single-target radar simulator in connection with its application to beam splitting and automatic track-while-scan problems. The considerations involved in the problem of three-dimensional simulation are presented in a section of this report. Work on the single target simulator included the testing of various azimuth estimation procedures employing the AFCRC digital beam splitter. Considerable effort was devoted to data reduction and analysis. Project Lion. Progress report P-5/133. CU 1-56-AF-1572-EE. Appendix A. Derivation of the rotation matrix. Simulation program started as Task IV of Contract AF 30(635)-2815, amended. For reports on earlier contracts see PB 118824, 118857 and 122375. AF CRC TN 56-575.

Subharmonic responses of the ferroresonant circuit, by E. Brenner. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Jun 1955. 78p photos, diagrs, graphs. Order from LC. Mi $4.50, ph $12.30. PB 124168

The responses of a series R-L-C circuit with nonlinear inductance, subjected to periodic voltages, are analyzed to determine conditions for subharmonic response. The effect of hysteresis in the iron and of large nonlinearity is studied on the basis of idealized coil characteristics. Normalized parameters for hysteresis loop width and saturation flux linkages are introduced in connection with coercive force, capacitance, impressed frequency and impressed voltage amplitude. The occurrence conditions for the various types and orders of subharmonic responses are then derived on the basis of the idealizations. Two types of subharmonic and fundamental frequency responses are predicted: symmetrical and unsymmetrical describing whether the response has half wave symmetry or not. AD 71220. PIB-359. PIB R-427-55. Contract Nonr-839(15), NR 375-214.

Synthesis of multipole control systems, by Herbert Freeman. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Apr 1956. 79p diagrs. Order from LC. Mi $4.50, ph $12.30. PB 123420

This report presents a method for the direct synthesis of multipole control systems, i.e., control systems having a multiplicity of inputs and controlled outputs. Only linear systems are considered. An analysis is given of the factors which affect system stability together with a technique for stabilizing systems having plants with unstable elements. The concept of error coefficients is extended to multipole systems by the definition of an error coefficient tensor. Equations are developed which permit the explicit solution for the required controllers in terms of the given plant and the desired overall responses. AD 90006. Project R-357-50-3. CU-24-56-AF-677-EE. Contract AF18(600)-677. CUN ERL TR T-15/B. AF OSR TN 56-26.

Tests of directive characteristics of antenna array of model YE homing equipment, by H. R. Johannessen and J. D. Wallace. U. S. Naval Research Laboratory. Jun 1941. 46p photo (1 fold), diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 120571

Unclassified 15 Dec 1953.
1. YE (Homing equipment) 2. Radio - Homing devices 3. Antennas, Directive 4. NRL R 1755.

Test of models DO, DO-1, DO-2, and DO-3, radio direction finder equipments, by John H. Gough. U. S. Naval Research Laboratory. Mar 1935. 205p graphs (part fold), tables. Order from LC. Mi $9.30, ph $31.80. PB 122796

1. DO (Radio direction finder) 2. Radio direction finders - Tests 3. NRL R 1134.

Test of class 1-A and 11-A receiving equipments modified as of 1 Feb 1935, by W. B. Burgess, John H. Gough, George Lyle and S. A. Greenleaf. U. S. Naval Research Laboratory. Mar 1935. 150p graphs, tables. Order from LC. Mi $7.20, ph $22.80. PB 122801

1. Radio receivers - Tests 2. NRL R 1140.

Test of model XTBL-4 radio transmitting equipment, by R. B. Meyer. U. S. Naval Research Laboratory. Mar 1939. 212p photos, diagrs (1 fold), graphs, tables. Order from LC. Mi $9.60, ph $33.30. PB 123246

1. XTBL-4 (Radio transmitting equipment) 2. Radio transmitters - Tests 3. NRL R 1525.

Traveling wave tubes and related studies, by David H. Sloan, John R. Whinnery and John R. Woodyard. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Microwave Tube Group, Berkeley, Calif. Dec 1955. 26p diagrs, graph. Order from LC. Mi $2.70, ph $4.80. PB 123983

Two-helix and three-helix backward-wave amplifiers of the cascade type were studied, and the latter

found to have a higher gain-bandwidth product. An experimental model of a two-helix mixer in which one helix is a backward-wave amplifier and the other a backward-wave oscillator gave conversion efficiencies up to .57, and it is believed that the design could now be improved. Interaction between several space harmonics, originally believed to be orthogonal, was observed on the multi-helix tubes, and several studies conducted to determine the source of the interaction. A velocity and current analyzer for the backward-wave tubes was also designed. Several studies in crossed-field tubes are described, including measurements on a forward-wave amplifier using a zig-zag slow-wave structure, and the design of a two-circuit backward-wave crossed-field tube. Several gun studies, especially on guns of the shielded type, were made. Electrostatic focusing of electron beams was studied analytically and experimentally, and attempts were made to combine rf interaction with an electrostatically focused beam. Analyses of the noise problem and the large-signal problem are discussed. Experiments were made on several novel high-density emitters, including a metallic arc, a Phillips ion gauge discharge, and a shielded field emitter. Task no. 41570. Summarizes research for the period Dec 1, 1954-Dec 1, 1955 under Contract AF 33(616)-495. AF WADC TR 56-18.

Type approval tests for TN-103/APX "Black Maria" transpondor (for IFF mark III), by D. P. Heritage. U. S. Naval Research Laboratory. Aug 1945. 11p graph, table. Order from LC. Mi $2.40, ph $3.30. PB 122769

Unclassified 15 Dec 1953.
1. TN-103/APX "Black Maria" (Transponder)
2. Radar - Beacons, Transpondor - Tests 3. NRL R-2635.

Variability of some characteristics of a group of fused-junction transistors, by G. H. Scithers. Stanford University. Electronics Research Laboratory, Stanford, Calif. Sep 1955. 34p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123988

An investigation of certain of the physical characteristics of transistors, derived from measurements of a group of 100 fused-junction transistors, is made for the purpose of determining the empirical relations that exist among them. Significant departure from the theoretical relations derived for the one-dimensional transistor is discovered. An approximate relation based on the measurements of the group of transistors is presented, together with some discussion of the possible reason for the discrepancy between the theoretical and empirical relations. In addition, it is shown that for this group of transistors, the low-frequency circuit parameters may be expressed as functions of but two basic physical quantities. AD 72662. SU ERL TR 92. Contract N6 onr-251(07), NR 373-360.

Visual message presentation. Scientific report no. 4 for period 1 Sep 1955-29 Feb 1956 under Contract AF 19(604)-1039, Item 1, by S. H. Chang, H. L. Stubbs, L. O. Dolansky, J. Wiren, C. R. Howard and M. J. Carrabes. Northeastern University. Electronics Research Laboratory, Boston, Mass. Feb 1956. 49p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 123407

The research is directed toward the specification of important parameters of speech for visual-message purposes and for use in speech-compression systems. The formant channel of the continuous-parameter analyzer (Plan I) has been improved by the addition of a third-format tracker and by several equipment changes in the previously described two-formant tracker. In the discrete-identification analyzer (Plan II), several equipment changes have made possible more reliable separation of certain groups of nonturbulent sounds. For 1st-2d reports under this contract see PB 116234 and 117208. AF CRC TN 56-159.

Generators, Motors, Transmission

Dielectric amplifiers. Final development report covering period 8 May 1952-1 Apr 1954 under Contract NObsr-57325(1738), by Lois L. DuFrain. Radiation, Inc., Melbourne, Fla. Apr 1954. 127p photos, diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 123182

This is the final engineering report concerning the development of a very low frequency dielectric type amplifier. The material and operating requirements for usable dielectric material for amplifiers and ways to improve characteristics of the available dielectric material are presented. After consideration of several types of circuits a ratio detector type dielector amplifier was selected. Development and measurements of this circuit, and coupling, are presented. Internal noise of the amplifier was found to be excessive. Major sources of this noise were isolated. Recommendations are made concerning the direction of future work and estimates of success of such work. Appendix I. Characteristics of bodies tested. - Appendix II. Properties of bodies in the system $BaTiO_3$, $BaSnO_3$, $SrSnO_3$. - Appendix III. Patents. - Appendix IV. Voltage-sensitive dielectrics as amplifiers, by James L. Jenkins. (Presented at a symposium on dielectric amplifiers, Carnegie Institute of Technology, Apr 16, 1953). Appendix V. Dielectric amplifier circuit analysis. - Appendix VI. Evaluation of transformer coupling. - Appendix VII. Derivation of expression for noise figure.

Fixed, low loss, monolithic glass capacitors, by Kristian H. Brandt. U. S. Squier Signal Laboratory. Components and Materials Branch, Fort Monmouth, N. J. Jul 1951. 28p diagr, graph, tables (part fold). Order from LC. Mi $2.70, ph $4.80. PB 124002

This report has been prepared to present the development of the modern glass capacitor and the accomplishments attained in its development during the life of Contract No. W36-039-sc-38227 with Corning Glass Works. It presents, also, an analysis of the extent to which the glass capacitor can be used as a replacement for the mica capacitor in view of capacitance/voltage ratio, electrical characteristics, adaptability to automatic production methods, and effect on the stockpiling program. Dept. of the Army project no. 3-26-00-602, Signal Corps project no. 2006-3. SCEL TM M 1359.

Investigations of magnetic amplifiers with feedback. Remington Rand Univac, Philadelphia, Pa. Mar 1956. 20p diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123403

Tests made on magnetic amplifiers excited by a sine-wave carrier were conducted to determine if the figure of merit could be improved by means of feedback techniques. The results are presented schematically and mathematically. In general, the investigations reveal that the power gain of the magnetic-amplifier device can be increased to an unlimited point, but that with this increase a finite rise time remains. Under these conditions the figure of merit, as it is ordinarily defined becomes meaningless. However, investigations reveal that, even under conditions in which feedback techniques are employed, the voltage-gain to magnetic-amplifier rise time ratio remains essentially constant and results in a useful figure of merit. Scientific report for period 1 Jun-1 Aug 1956 under Contract AF 19-(604)-1376. AF CRC TN 55-582.

Magnetic development in Japan during World War II. U. S. Naval Technical Mission to Japan. Jan 1946. 61p diagrs, graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 99 cents. PB 123210

Includes the following enclosures: A. List of titles of research projects carried out since Jan 1941. - B. Report of investigation of magnetic amplifiers: Special characteristics of experimental set, by K. Harada. - C. Summary of reports and laboratory notes on applications of the magnetic amplifier, by K. Harada. - D. Remarks on high purity silicon-steel specimens, by K. Mihara. - E. Magnetic amplifier, by K. Mihara. - F. Production figures of magnetic alloy steels (in metric tons) 1940-1944, by Tohoku Kinzoku. - G. List of Japanese documents forwarded to the Washington document center. - H. List of Japanese personnel interviewed.
1. Alloys, Magnetic - Japan 2. Magnetic materials - Use as core materials - Japan 3. Magnetic materials - Japan 4. Amplifiers, Magnetic - Design - Japan 5. Magnetic research - Japan 6. Steel, Silicon - Magnetic properties - Japan 7. BIOS JAP PR 1283.

Nonlinear oscillators with constant time delay, by W. J. Cunningham. Yale University. Dunham Laboratory of Electrical Engineering, New Haven, Conn. Aug 1955. 66p diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123019

In this report is given a discussion of a family of oscillators involving constant time delay together with a nonlinear amplifying system. Nonlinear differential-difference equations are needed to describe the operation, and techniques are developed to handle these equations. Contract Nonr-433(00), Report 9.

Partial analysis of the effects of subharmonics in the AC supply voltage of a magnetic modulator, by Roy W. Roberts, Jr. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. RF Components Laboratory, Bedford, Mass. Feb 1956. 12p diagr, graph. Order from LC. Mi $2.40, ph $3.30. PB 123404

An analytic expression is derived for determining the amount of variation in the interpulse period when a pulse generator using saturable reactors as switching devices is being driven by an imperfect sine wave source. This imperfect sine wave source can very easily result from small mechanical imperfections in a multipole alternator. AF CRC TR 56-104.

Principles of design for miniaturized broadband, high power RF transformers. Final report covering the period 15 Mar 1953 to 15 Sep 1954 under Contract no. DA-36-039-SC-42701, by H. Romander, D. Cherry, W. Jakubowski and E. Smith. Sierra Electronic Corporation, San Carlos, Calif. Apr 1956. 182p photos, drawings, diagrs, graphs, tables (1 fold). Order from LC. Mi $8.40, ph $28.80. PB 124088

Five quarterly progress reports were issued. All material of technical value in those reports is included in this final report. Part 1 deals with theory of equivalent circuits, element calculations, and transformer terminology. Part 2 deals with transformer design, with examples covering two frequency ranges. Part 3 describes physical studies made in conjunction with the program, -behavior of ferrite materials, coil losses, and core losses Part 4 illustrates a few applications of ferrite materials to transformers which handle more than 1 kw of rf energy and to other matching devices which also handle large amounts of power. Dept. of the Army Project No. 3-26-00-602. Signal Corps Project No. 2006-C. "Nomenclature" is 3 folded pages.

Vacuum tube current amplifier, by Ramond C. Waddel. U. S. Naval Research Laboratory. Dec 1942. 12p photos, drawings, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 120604

1. Amplifiers, Current 2. Circuits, Amplifier 3. NRL O 1970.

Design of minimum weight magnetic cores, by John W. Kallander. U. S. Naval Research Laboratory. Jan 1957. 8p diagr, graph. Order from OTS. 50 cents. PB 121776

A method of calculating the configuration of the magnetic core, case, and coil yielding minimum weight for a given volt-second capacity of a magnetic core and coil is developed and applied to a typical illustration. The analysis is very general and takes into account limiting quantities such as winding resistances, magnetizing currents, etc. The analysis can be extended to take into account the weights of other related components such as the associated batteries merely by the addition of the appropriate terms to the total weight equation. NRL R 4895.

Enclosed submarine battery storage cell problem, by H. D. Crockford. U. S. Naval Research Laboratory. Nov 1933. 85p diagrs, graph, tables. Order from LC. Mi $4.80, ph $13.80. PB 122727

1. Submarines - Batteries 2. Batteries, Storage - Hydrogen generation - Control 3. NRL P-1005.

Silver oxide-zinc alkaline primary cell. Part IV: Anodic characteristics of zinc alloys, by C. M. Shepherd. U. S. Naval Research Laboratory. Feb 1957. 25p graphs, tables. Order from OTS. 75 cents. PB 121744

Preliminary work has been done on determining the capacity of the silver oxide-zinc alkaline cell when using various zinc alloys as a sheet anode. Most alloying elements decrease cell capacity, particularly if they are present in appreciable amounts. Mercury definitely improves cell capacity. A few other elements such as cobalt and calcium show some increased cell capacity but need further testing. For Part 1 see PB 109794. NRL R 4885.

FUELS AND LUBRICANTS

Alaskan test site oil exposure program, by Robert J. Benzing. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1957. 59p graphs, tables. Order from OTS. $1.50. PB 121846

A program was undertaken to determine the effect of prolonged outdoor unheated shed storage on the pour points of several specification oils of mineral oil and diester base stock origin. Qualitative daily visual observation and monthly pour point data on ten mineral oils and four diester oils covering two years of observation in Fairbanks, Alaska, are reported. The conclusion drawn was that with the increase of use of synthetic oils, no problem should be experienced in low temperature use after storage. AD 110702. Project 3044, Task 73314. Data are reported for 11 Nov 1952 - 12 Nov 1954. AF WADC TR 56-1.

Analytical procedures for rocket propellants. IV: Hydrazine, by John D. Clark. U. S. Naval Air Rocket Test Station, Lake Denmark, Dover, N. J. May 1951. 9p. Order from LC. Mi $1.80, ph $1.80. PB 124688

Presents a discussion of various methods of assay of hydrazine for its major constituents, outlines the shortcomings of each method, and describes routine procedures for hydrazine assay as adapted and used in the Propellants Laboratory of the Naval Air Rocket Test Station. Project no. TED-NARTS-pp-502. NARTS R 9.

Conversion kit, automatic proportioning, incendiary oil mixing and transfer unit, E7(U), by James D. Larkin and Harold L. Gotoff. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Jan 1956. 45p photos. Order from LC. Mi $3.30, ph $7.80. PB 122591

This report covers the details and results of the final development test of a conversion kit to be used for modernization of the standard M3 incendiary oil mixing and transfer unit to the new standard AN-M3-A1 incendiary oil mixing and transfer unit. The test program established the ability of the unit generally to satisfy the design characteristics and to accomplish the desired conversion. Final development test no. 127. Project 4-09-06-004-07. CC CRL R 598.

Cooperative fuel testing. Progress report (a), by Parry Borgstrom. U. S. Naval Research Laboratory. Dec 1933. 4p. Order from LC. Mi $1.80, ph $1.80. PB 122723

1. Oil fuel - Tests 2. NRL P 1012.

Effect of storage on the physical characteristics of grease, by Robert J. Burger and Bernard Rubin. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1953. 25p photos, graphs (1 fold), tables (1 fold). Order from LC. Mi $2.70, ph $4.80. PB 125044

The effect of prolonged storage under accelerated conditions on three types of specification greases is described. Periodic tests using standard methods including penetration, oxidation stability, and low temperature torque were performed on samples of the greases packed both in cans and in bearings. Data thus obtained over the 24 month storage period at 130°F are tabulated and trends are presented graphically. AF TR 6385.

Experimental investigation on the boundary conditions of liquid friction in oscillatingly loaded friction bearings (Experimentelle untersuchung der grenzbedingungen flüssiger reibung im oszillierend belasteten gleitlager), by Piet Hein. Translated and edited by F. A. Raven. Mar 1956. 41p photos, drawing, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122457

A translation of a report on an investigation carried out on the Mechanical Engineering Laboratory of the Karlsruhe Institute of Technology under the direction of Prof. H. Thoma. After a brief statement of the problem, test methods are discussed and test apparatus is explained. Translated from Petroleum, no. 19, 11 May 1954, p. 1-14. STS 231. NAVSHIPS T 604.

Investigation of flame stability and drag losses for flame holders in a free stream, by Gustave G. Kutzko. Battelle Memorial Institute, Columbus, Ohio. Nov 1955. 59p photos, diagr, graphs, tables. Order from OTS. $1.50. PB 121794

As a part of a fundamental investigation of the flame holding phenomenon in high-velocity streams, studies have been made of the behavior of simple axially-symmetric shapes as flame holders in a free-stream homogeneous fuel-air mixture with the aid of a special drag-force balance. The combustion stability limits and drag-force losses, due to the flame holders, were experimentally determined. The data are presented in a fashion that permits an evaluation to determine the optimum flame-holder shape, that is, the shape resulting in the minimum drag for a given flame-holding ability. Results showed that the hemisphere was the optimum low-drag shape of flame holder and that, for homogeneous mixtures, the hollow and solid flame holders are equally effective. A correlation suggested in the literature for parameters relating drag and flame-holding ability was tested, but found unsatisfactory. AD 110495. Project 3012, Task 70334. AF WADC TR 55-429. Contract AF 33(038)-12656.

Investigation of the effect of anticorrosive admixtures to oils by the method of radioactive tracers (Issledovanie mekhanizma leistviya antikorrozionnykh prisadok k maslam metodom radioaktivnykh indkatorov), by Iu. S. Zaslavskii, S. E. Krein and R. N. Shneerova. Translated by Lloyd G. Robbins. Edited by Margaret W. Raven. Oct 1956. 18p graphs. Order from OTS. 50 cents. PB 121740

A method is proposed for the investigation of the development of films on the surfaces of metal using anticorrosive admixtures. It is demonstrated that a film is formed with the participation of the principal component in the anticorrosive admixture, i.e. sulfur or phosphorus. It is also demonstrated that a diffusion of sulfur deep into the metal, and a combination of the metal with the oil, take place as a result of the chemical reaction between them. Translated from Zhurnal Fizicheskoi Khimii (Journal of physical chemistry) vol. 29, no. 10, 1955, pp. 1815-1821. STS 240. NAVSHIPS T 613.

Micro lubricant test methods. Part IV: Evaporation loss of lubricating greases and oils, viscosity of lubricants at -65°F, and foaming characteristics of crankcase and aircraft engine lubricating oils, by John B. Christian. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1956. 17p tables. Order from OTS. 50 cents. PB 121849

This report describes test methods for the determination of evaporation loss of lubricating greases and oils, viscosity of lubricants at -65°F., and the foaming characteristics of crankcase and aircraft engine lubricating oils. All procedures were arrived at through the comparison of the micro test results with results obtained through the use of existing test procedures. AD 110587. Project 3044, Task 73314. Covers period of work from Sep 1955-Apr 1956. For Parts 1-3 see PB 121355, 121386, and 121443. AF WADC TR 55-449, Part 4.

National annual survey of aviation gasoline and aviation jet fuel, 1954 production, by O. C. Blade. U. S. Bureau of Mines. Apr 1955. 22p graphs, tables. Available free from the U. S. Bureau of Mines, Washington 25, D. C. PB 122935

Analytical data are presented for 101 samples of aviation gasoline. Data also are given for 30 samples of aviation jet fuel. The analyses were made on samples typical of the manufacturers' 1954 production in their laboratories and the results submitted to the Bureau of Mines for compilation. The products of 19 manufacturers of aviation gasolines and of 15 producers of aviation jet fuels are represented. BM RI 5132.

Stribeck curve as a characteristic of the general frictional behavior of lubricated friction surfaces (Stribeck-kurve als kennzeichen des allgemeinen reibungsverhaltens geschmierter gleit flächen), by G. Vogelpohl. Translated and edited by F. A. Raven. Mar 1956. 31p photo, diagrs, graphs. Order from LC. Mi $3, ph $6.30. PB 122606

The experiments made by R. Stribeck in 1902 concerning the properties of friction bearings revealed clearly for the first time the curve of the friction factor for various operating conditions; this curve, moreover, later proved peculiar for all lubricated friction surfaces. Starting from the principles of liquid friction, the slope of the entire Stribeck curve can be explained and calculated with satisfactory exactitude. Translated from Zeitschrift des Vereines Deutscher Ingenieure, vol. 96, no. 9, 21 Mar 1954, p. 261-268. NAVSHIPS T 605. STS 232.

HIGHWAYS AND BRIDGES

Rigid pavement investigation materials studies: Report on studies of flexural strength of concrete. U. S. Army. Corps of Engineers. Ohio River Division Laboratories. Rigid Pavement Laboratory, Mariemont, Ohio. Jun 1954. 38p graph, tables. Available from Ohio River Division Laboratories, Corps of Engineers, U. S. Army, 5851 Mariemont Ave., Mariemont, Cincinnati 27, Ohio. PB 123190

The studies were concerned primarily with the gain in flexural strength of concrete test specimens up to the age of 90 days. However, the effects of the different concrete materials and mixes used, as well as of the test conditions, on the flexural strength of the concrete is of equal importance. The data have been evaluated with regard to pertinent factors which tend to influence the flexural strength of the concrete, and recommendations are made for establishing more uniform test conditions and procedures.

Soil compaction investigation. Report no. 7: Effect on soil compaction of tire pressure and number of coverages of rubber-tired rollers and foot-contact pressure of sheepsfoot rollers. U. S. Waterways Experiment Station, Vicksburg, Miss. Jun 1956. 80p photos, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 123073

This report presents the results of a field and laboratory study of the effects of tire pressure and number of coverages of rubber-tired rollers and foot-contact pressure of sheepsfoot rollers on the compaction and stress-strain characteristics of a lean-clay soil. Laboratory- and field-compacted samples of the clay were subjected to water content, density, CBR, and triaxial shear tests. Increasing the foot pressure of the sheepsfoot roller used had little effect on the degree of compaction or strength obtained in the test soil. For reports 1-6 see PB 110150-110153, PB 101510, and PB 115406. WES TM 3-271.

Trafficability studies of some Alaskan silts. Progress report 1 Jun 1954 to 1 Jun 1955 under Contract Nonr-530(04), by A. C. Mathews, R. L. Handy, D. T. Davidson and C. J. Roy. Iowa. Engineering Experiment Station, Ames, Iowa. Jul 1955. 48p photos, maps, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 124493

As part of a 1954 project investigation of silts and glacial deposits in Alaska, the trafficability of various silt deposits was estimated by means of a U. S. Corps of Engineers cone penetrometer. This instrument is essentially a cone-tipped rod which is slowly forced into the ground by hand; during the test, the resistance of the ground to penetration by the cone is measured at several depths. These data have been correlated by the Corps of Engineers with the abilities of various soils to support vehicular traffic. Project 320-S

INSTRUMENTS

Comparison of night vision testers, by William M. Rowland and Joseph Mandelbaum. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jan 1944. 8p. Order from LC. Mi $1.80, ph $1.80. PB 124044

1. Night vision - Tests 2. Vision - Dark adaptation - Tests 3. AF SAM Proj. 213, Report 1.

Comparison of performance upon the E-4 fire control system simulator and upon operational equipment, by Guy G. Besnard and Leslie J. Briggs. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Armament Systems Personnel Laboratory, Lowry Air Force Base, Colo. Apr 1956. 22p photo, tables. Order from LC. Mi $2.70, ph $4.80. PB 124112

Two groups of subjects, chosen by a table of random numbers, were given a performance test consisting of three check and adjustment procedures which are standard tasks in maintenance of the E-4 Fire Control System. All subjects had just completed normal training in the appropriate phase of the course. One group of subjects was tested on operational fire control equipment; the other group was tested on the E-4 procedural simulator. In terms of total performance errors made, no difference was found between the two groups, suggesting that scores earned on the simulator are like those earned on operational equipment. Project no. 7709, Task no. 77153. AF PTRC TN 56-47.

Completely portable radioactivity meter requiring no high voltage battery, by Herman F. Kaiser. U. S. Naval Research Laboratory. Dec 1938. 15p photos. Order from LC. Mi $2.40, ph $3.30. PB 123296

1. Meters, Radiation - Design 2. NRL M-1501.

Computer components fellowship no. 347. Mellon Institute of Industrial Research, Pittsburgh, Pa. Contract AF 19(604)-943. Order separate parts described below from LC, giving PB number of each part ordered.

Quarterly report no. 9 second series, for the period Oct-Dec 1955. Feb 1956. 69p photos, diagrs, graphs, tables. Mi $3.90, ph $10.80. PB 124507

For 1st-8th reports, second series, see PB 114377, 114976, 115560, 117013, 117590, 117776, 118861 and 122361. Contents: I. High temperature components via vacuum evaporation, by C. H. T. Wilkins. - II. Printed ceramic circuitry, by Martin N.

Holler. - III. High temperature testing, by C. H. T. Wilkins and Robert L. Serenka. - IV. Voltage - dependence of electroluminescent brightness, Part III: A general relationship, by A. Milch and J. J. Mazenko. - V. Particle size effects in electroluminescence, by A. Milch and J. J. Mazenko. - VI. Quenching of thermoluminescent glow peaks, by A. Milch. AF CRC TN 56-574.

Quarterly report no. 10, second series, for the period 1 Jan-31 Mar 1956. Mar 1956. 60p photos, diagrs, graphs, tables. Mi $3.60, ph $9.30. PB 123673

For 1st-8th reports, second series see PB 114377, 114976, 115560, 117013, 117590, 117776, 118861 and 122361. Contents: Part I. Graphic circuits for high temperatures: I. Resistors by vacuum evaporation and deposition, by C. H. T. Wilkins. - II. Ceramic circuitry by screen process, by Martin N. Haller. - III. Sprayed resistors, by C. H. T. Wilkins. - IV. High temperature testing, by Robert L. Serenka. - V. Circuit layout and design, by C. H. T. Wilkins. - VI. Silicon monoxide protective films, by C. H. T. Wilkins. - Part II. Electroluminescence: - VII. Effect of various metal electrodes on electroluminescence, by Jerome J. Mazenko. - VIII. Tests for electroluminescence in uranyl nitrate crystals, by W. J. Kirkpatrick and Jerome J. Mazenko. AF CRC TN 56-30.

German night vision tester, by William M. Rowland and Allan Hemingway. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1945. 5p photos, diagr. Order from LC. Mi $1.80, ph $1.80. PB 124049

Unclassified 15 Aug 1945.
1. Night vision - Testing equipment - Germany
2. AF SAM Proj. 368, Report 1.

Gripping device to test brittle metal single crystals in tension, by L. C. Weiner. Columbia University. School of Engineering. Sep 1956. 5p diagr. Order from LC. Mi $1.80, ph $1.80. PB 124315

Tensile testing of metal single crystals that behave in a brittle manner is a major problem due to the delicate nature of the specimens. This problem resolves itself into utilizing suitable gripping devices by which axiality of load is maintained and by which any deformation in the crystal prior to testing is prevented. In the course of a study involving the tensile testing of brittle zinc single crystals, a set of grips was designed and used satisfactorily in which specimens could be employed without having conventional threaded or enlarged ends. AD 96504. Also in Review of Scientific Instruments, vol. 27, no. 12, p. 1081, Dec 1956. AF OSR TN 56-423. Contract AF 18(600)-898.

High altitude radiosonde hypsometer, by W. C. Conover and W. G. Stroud. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jul 1954. 24p photo, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 123975

Efforts to improve the basic design of a high-altitude radiosonde hypsometer have resulted in a working model consisting of a small vacuum flask filled with cotton which has been saturated with carbon-disulfide, and in which is immersed a bent-stem beam thermistor. In laboratory tests this device proved capable of measuring pressures within one percent in the range 300 to 5 mb and within two percent in the range 5 to 2 mb. Flight tests under actual field conditions have shown that this model functions with an accuracy of two to three percent in the pressure range 30 to 2 mb. Dept. of the Army project no. 3-99-07-021. Signal Corps project no. 745 A-0. SCEL TM M-1595.

Hum and microphonics test set. U. S. Armed Services Electro Standards Agency, Fort Monmouth, N. J. May 1952. 1p drawing only. Order from LC. Mi $1.80, ph $1.80. PB 124654

1. Noise, Microphonic - Testing equipment - Design
2. Acoustic chambers - Design 3. JAN-182.

Improved instrumentation for searchlight probing of the stratosphere. Final research report, by Stephen S. Friedland, Jack Katzenstein, Jack Sherman and Michael R. Zatzick. Connecticut. University. Physics Department, Storrs, Conn. May 1956. 117p photos, diagrs, graphs, tables. Order from LC. Mi $6, ph $18.30. PB 124492

An optical pulse searchlight system, based on radar techniques, has been developed for measuring the density profile of the upper atmosphere. A light source which emits 50 megalumens, 20 u-sec. in duration, is placed at the focal point of a 60" mirror. A photomultiplier, which is part of a logarithmic recording system covering a dynamic range of four orders of magnitude, is placed at the focal point of a similar mirror. Each time the light is pulsed an entire density profile is obtained. AF CRC TR 56-278. Contract AF 19(604)-290.

Machine methods of computation and numerical analysis. Quarterly progress report no. 2 under Contract N5 ori-60. Massachusetts Institute of Technology. Division of Industrial Cooperation. Dec 1951. 14p table. Order from LC. Mi $2.40, ph $3.30. PB 123132

Project DIC 6915. Contents: Variational calculation of nuclear scattering, by S. I. Rubinow. - Computation of an integral occuring in second Born approximation calculations, by Maurice C. Newstein. - Solutions of the aerodynamical equations; Life and moment calculations, by Pao-Tan Hsu. - Machine methods for processing X-ray diffraction data, by F. J. Corbato. - The integration of hyperbolic partial differential equations, by Phyllis Fox.

Magnetic decision element reliability, by L. P. Gieseler. U. S. Naval Ordnance Laboratory, White Oak, Md. Sep 1954. 17p photo, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 124839

This report describes a series of tests made at NOL for the purpose of evaluating the reliability of magnetic decision elements. On the basis of the results it is concluded that a computing system comprising 100 decision elements of the type tested can be expected to operate between 22 and 45 hours before the occurrence of a decision element failure. Two other types of malfunctions were observed, i.e., marginal operation and external wiring troubles. NAVORD 3812.

Measuring field handling and transportation conditions, by Donald S. Martin. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1956. 32p photos, diagrs, graphs, tables. Order from OTS. $1. PB 121866

The development of an instrument of sufficient accuracy to measure rough handling in terms of inches of drop height is reported. Cost of the instrument is $200 each. The statistical shipping plan for using the instrument and a method of relating the data obtained to container design is also discussed. AD 110586. Project 7312, Task 73127. Covers work from Nov 1954 through July 1956. AF WADC TR 56-464.

Naval Research Laboratory dissolved oxygen indicator for continuous analysis of boiler feed-waters, by R. L. Tuve. U. S. Naval Research Laboratory. Mar 1941. 66p photos, drawings (part fold), diagrs, graphs (part fold), table. Order from LC. Mi $3.90, ph $10.80. PB 123301

1. Feed water - Purification 2. Deaerators - Design 3. Indicators, Oxygen - Design 4. NRL P 1703.

Photometer for calibrating the AAF Eastman night vision tester, by Joseph Mandelbaum and William M. Rowland. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1944. 5p photo, Order from LC. Mi $1.80, ph $1.80. PB 124045

1. Photometers - Calibration 2. Night vision - Testing equipment 3. AF SAM Proj. 262, Report 1.

Stroboscopic film reader. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Mar 1949. 86p photos, diagrs (1 fold), tables. Order from LC. Mi $4.80, ph $13.80. PB 125237

This report presents detailed information concerning the design and operation of the Stroboscopic Film Reader constructed by the Ballistic Research Laboratories, Aberdeen Proving Ground, for the evaluation of Doppler film. The theory and principles of operation of the various mechanisms involved are discussed; and in addition, complete wiring diagrams and alignment procedures are given for the use of maintenance personnel. APG BRL TN 5.

Stroboscopic film reader, by J. Leeder. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1949. 14p photos, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 125238

This report presents an overall picture of the design and operation of the Stroboscopic Film Reader, an electro-mechanical apparatus for the expeditions counting of Doppler radio signals as recorded on standard 35 mm motion picture film. The apparatus can be used for the counting of any periodic signals recorded on film, provided that the spacings between the signals fall within certain limits which are defined. APG BRL R 706.

Submarine hydrogen detectors, by Sherman W. Rabideau, G. W. Work and F. S. Thomas. U. S. Naval Research Laboratory. Jun 1944. 92p graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 123375

1. Indicators, Gas - Tests 2. Submarines - Hydrogen detection 3. Mark I (Hydrogen detector) 4. NRL P-2314.

Test of revised model QA underwater sound equipment, manufactured by Audio Research, Inc., by John H. Gough and S. A. Greenleaf. U. S. Naval Research Laboratory. May 1935. 57p diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 122802

1. QA (Underwater sound equipment) 2. Sound, Underwater - Receiving equipment - Tests 3. NRL R 1155.

Test of wind intensity and direction indicating equipment, by W. B. Roberts. U. S. Naval Research Laboratory. Jul 1936. 20p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 122702

1. Indicators, Wind direction - Tests 2. Indicators, Wind velocity - Tests 3. NRL B-1284.

MEDICAL RESEARCH AND PRACTICE

Aortic homografts in dogs including the renal arteries. Technic and renal function, by John A. Schilling, Ernest L. Becker, C. F. Bowers and D. Gold. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Mar 1956. 16p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123663

The technical procedure for homografts of the abdominal aorta including the renal arteries is described. Extensive renal function studies were carried out to elucidate the mechanisms and changes that occurred immediately after such an operative procedure as well as during the recovery period. When the renal artery anastomosis remained patent, a good recovery of renal function occurred after periods of total ischemia up to 80 minutes. AF SAM R 55-115.

Detection of asymptomatic viral infections in the embryonated egg. B: Immunologic studies with viral hepatitis, by Morris Pollard and L. T. Diserens. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Mar 1956. 10p graphs, tables. Order from LC. Mi $1.80, ph $1.80. PB 123665

When serums from acute IH and SH cases were inoculated into embryonated eggs, increased number of histiocytes appeared in the allantoic fluid. Convalescent serums from the same patients failed to elicit this reaction. This nonspecific cytologic reaction was rendered specific by mixing inoculums with antiserums prior to inoculation. AF SAM R 56-10.

Effect of pressure wrapping of frozen rabbit ears on the (1) subsequent development of edema and (2) degree and rate of recovery, by Robert B. Lewis and Malcolm R. Miller. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1947. 3p. Order from LC. Mi $1.80, ph $1.80. PB 124050

1. Frostbite - Therapy 2. Edema - Prevention 3. AF SAM Proj. 489, Report 1.

Effects of residual mercury on strength, flow, and dimensional change of dental amalgam, by Marjorie L. Swartz and Ralph W. Phillips. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Mar 1956. 8p graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 123667

Amalgam was condensed employing four different procedures for the removal of mercury from the individual increments during its condensation. In none of the procedures, however, were increments used where the mercury content was either insufficient or too great for practical use. Both hand and mechanical condensing were employed. No correlation could be noted between the physical properties or residual mercury content and the specific method of packing. AF SAM R 56-13.

Frostbite and factors in the therapy of frostbite, by Malcolm R. Miller. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1947. 7p. Order from LC. Mi $1.80, ph $1.80. PB 124051

1. Frostbite - Therapy 2. AF SAM Proj. 492, Report 1.

Handbook, aviation otolaryngology, by C. M. Kos and H. D. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Aug 1944. 1p. Order from LC. Mi $1.80, ph $1.80. PB 124046

Consists only of a note that the handbook has been prepared.
1. Otolaryngology 2. AF SAM Proj. 303, Report 1.

Mechanisms of natural acclimatization. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Order separate parts described below from OTS, giving PB number of each part ordered.

Excretion of urinary steroids at sea level and at high altitudes, by Mauricio San Martin, Yolanda Prato and Luis Fernández. Aug 1956. 3p tables. 50 cents. PB 121829

A comparative study was made of the urinary excretion of 17-ketosteroids and reducing corticosteroids in healthy adult men living at sea level and in native residents living at an altitude of 14,900 feet. No significant differences were observed between the two groups. The variability observed in the results was also of about the same degree at both altitudes. AF SAM R 55-100.

Observations on the iron metabolism and the free protoporphyrins of the erythrocytes in the polycythemia of high altitudes, by César Reynafarje and Rodolfo Lozano. Aug 1956. 8p graph, tables. 50 cents. PB 121828

Iron metabolism and concentration of free protoporphyrins in circulating red cells were observed in four groups of subjects: (1) men living at sea level, (2) natives at 14,900 feet altitude, (3) men taken to high altitude for temporary exposure, and (4) subjects studied at sea level after returning from six months at high altitudes. AF SAM R 55-99.

Pharmacological evaluation of epinephrine-like compounds, by F. L. Minzenberger and E. J. Hawrylewicz. Armour Research Foundation, Chicago, Ill. Feb 1955. 30p graph, tables. Order from LC. Mi $3, ph $6.30. PB 124337

Report characterizes the biological effects of epinephrine and serotonin (5-hydroxtryptamine) by means of inhibition and potentiation analysis. An equation was developed which related the potentiation of the effects of epinephrine produced by cocaine. Other combinations tested and evaluated were: 1) d-lysergic acid diethylamide tartrate (LSD-25) vs epinephrine; 2) LSD-25 vs serotonin;

3) d-iso-LSD vs serotonin. ARF Proj C-059, Final report.

Physiological adaptation to chronic hypoxia. C: Acid-base adjustments, by G. S. Husson and A. B. Otis. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Mar 1956. 7p graphs, tables. Order from LC. Mi $1.80, ph $1.80. PB 123668

The P_CO_2, $BHCO_3$, and pH of the arterial blood of 35 individuals who were hypoxic because of the presence of right to left circulatory shunts have been measured and compared with similar measurements made on the arterial blood of 12 nonhypoxic individuals. Most of the hypoxic individuals have a metabolic acidosis which, on the average, is proportional to the degree of hypoxia. It is suggested that such an acidosis, by raising the delivery pressure of O_2 in the tissues, represents an advantageous adaptation to hypoxia of circulatory origin. AF SAM R 56-25.

Prolongation of sulfhydryl protection in irradiated mice, by Joe E. Smith. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Dec 1956. 5p graphs, table. Order from OTS. 50 cents. PB 121843

Female mice were injected subcutaneously with emulsions of aqueous solutions of both cysteine and glutathione suspended in oil, prior to exposure to 875 r gamma radiation. The injection-irradiation interval for the test groups was either 0, 2, or 4 hours. Protection was noted in the glutathione-treated animals after periods up to and including 4 hours post-injection. In the cysteine-treated animals, protection was noted after periods of 0 and 2 hours with no protection observed after 4 hours. AF SAM R 56-111.

Protection of pyrimidines by sulfur compounds from destruction by irradiation, by Robert M. Dowben. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Sep 1956. 5p graphs, tables. Order from OTS. 50 cents. PB 121844

The destruction of several pyrimidines and their corresponding nucleosides and nucleotides in aqueous solutions by irradiation with x-rays and gamma rays has been studied. The bases uracil and cytosine and their corresponding nucleosides and nucleotides were found to be particularly sensitive to irradiation, and to destruction by Fenton's reagent as well. Irradiation of solutions at room temperature and at -60°C. and at several concentrations has made possible an evaluation of direct and indirect effects The addition of the sulfhydryl compounds glutathione, cysteine, cysteamine, β -aminoethylisothiouronium dibromide and thiourea to the pyrimidine solutions results in protection from destruction upon irradiation. The protective effect of the sulfhydryl compounds in this system has been compared with their relative protective action in the whole animal. AF SAM R 57-36.

Response of plasma potassium to acute decompression stress in adrenalectomized dogs, by Frederick P. Ferguson, Dietrich C. Smith, and Jeanne Q. Barry. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Nov 1956. 15p tables (1 fold). Order from OTS. 50 cents. PB 121842

Some effects of decompression to a simulated altitude of 30,000 feet for 90 minutes (three 30-minute periods) have been studied in bilaterally adrenalectomized dogs maintained on cortisone or DCA, or in moderate adrenal insufficiency. The results have been compared with those previously obtained on intact dogs under similar conditions. AF SAM R 57-14.

Testing of hearing in the armed services. Proceedings of the third annual meeting, by Hallowell Davis, Donald H. Eldredge and J. Richardson Usher. Armed Forces - National Research Council. Committee on Hearing and Bio-Acoustics. Oct 1955. 147p diagrs, graphs, tables. Order from LC. Mi $7.20, ph $22.80. PB 124553

Principal topics discussed were: 1. What is normal hearing?; 2. Why do we use audiometry?; 3. Problems in testing of hearing in the armed services. For Chaba reports 1-2, 4 see PB 115827, 117853 and 119827. Nonr-1151(01), NR 140-069, Technical report 8.

Value of treatment of experimental cerebral edema with intravenous hypertonic glucose, albumin, and dextran, by Raymond A. Clasen, Richard R. Prouty, W. George Bingham, Felix A. Martin and George M. Hass. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Sep 1956. 28p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 121831

Localized cerebral lesions were produced by freezing through the intact calvarium of anesthetized dogs. Water and blood accumulated in the region of the injury. Lesions more than 2 hours old contained relatively greater amounts of water than of blood. Simultaneously, cisternal pressure increased. Modifications of these responses to equivalent lesions were attempted with intravenous hypertonic solutions. AF SAM R 55-87.

Visual fields in the dark adapted state, by Francis C. Keil, Jr. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Dec 1942. 11p photos, diagr, table. Order from LC. Mi $2.40, ph $3.30. PB 124040

Unclassified 15 Aug 1945.
1. Vision - Dark adaptation - Effect of dim illumination 2. Night vision - Testing equipment 3. AF SAM Proj. 35, Report 1.

Chromium-base alloys, by R. G. Nelson and H. G. Anderson. U. S. Bureau of Mines. Jan 1955. 23p photos, graph, tables. Available free from the U. S. Bureau of Mines, Washington 25, D. C. PB 123109

An investigation was made of chromium-iron alloys, primarily in the range 50 to 70 percent chromium, using high-purity iron and chromium and arc-melting techniques. Hardness values reached a maximum 400 Brinell near 70 percent chromium and decreased to 230 Brinell at 100 percent chromium. The alloys up to 70 percent chromium could be forged and rolled, and bend tests revealed significant ductility which can be improved by lowering the oxygen content or by heat treating. Elongation values of 15 percent were found in a 60Cr-40Fe alloy containing 0.0085 percent oxygen. Similar alloys containing about 0.2 percent oxygen had little or no ductility in the hot-worked condition but attained elongation values as high as 14 percent after heat treatment. Report covers the period 15 Jun 1952-15 Jun 1953. BM RI 5107.

Crack propagation in the hydrogen-induced brittle fracture of steel, by W. J. Barnett and A. R. Troiano. Case Institute of Technology, Cleveland, Ohio. Aug 1955. 58p photos, drawings, graphs, tables. Order from OTS. $1.50. PB 121065

The mechanism of the hydrogen-induced static fatigue fracture process has been investigated and its macroscopic features have been identified. The development of an electrical resistance method for crack growth measurement permitted an analysis of the kinetics of the static fatigue crack propagation process and the factors which determine the static fatigue fracture stress. The kinetics of the "slow" growth were determined by the hydrogen distribution in the specimen at the time of application of the load, and the hydrogen redistribution which accompanied aging under load. Project no. 7351, Task no. 70645. AF WADC TN 55-405. Contract AF 33(038)-22371.

Effect of changing cyclic modulus on bending fatigue strength, by A. A. Blatherwick and B. J. Lazan. Minnesota. University. Dept. of Mechanics and Materials, Minneapolis, Minn. Oct 1956. 129p photos, drawings, diagr, graphs, tables. Order from OTS. $3.25. PB 121816

The implications of changing cyclic properties of a material are analyzed by means of hypothetical cyclic stress-strain curves. The effects of cross-sectional shape of specimen and of loading conditions on fatigue strength are investigated through calculations based on the assumed materials behavior. Two types of material are considered, one of which has a strain-hardening characteristic, while the other becomes softer under repeated cycling. In the second phase of the work, actual materials are tested in reversed-flexure fatigue to provide experimental verification of the results obtained in the hypothetical analysis. It is concluded that the type of material is exceedingly important in determining the effect of specimen shape and type of test on fatigue strength. AD 110492. Project 7360, Task 73604. Covers work from Jan 8, 1954-Dec 1, 1955 under Contract AF 33(616)-2803. AF WADC TR 56-127.

Embrittlement of steel by superheated steam (preliminary report), by Rudolph H. Cowen. U. S. Naval Research Laboratory. Mar 1940. 12p. Order from LC. Mi $2.40, ph $3.30. PB 123312

1. Steel - Brittleness 2. NRL M 1601.

Fluidity of cast steel. U. S. Naval Research Laboratory. Order separate reports described below from LC, giving PB number of each part ordered.

Progress report II, by C. W. Briggs and H. F. Taylor. Sep 1938. 37p photos, diagrs, graphs, tables. Mi $3, ph $6.30. PB 123309

Previous report is M-1264.
1. Steel castings - Fluidity 2. Steel castings - Carbon content 3. NRL M 1474.

Summary report, by H. F. Taylor, E. A. Rominski, and J. L. Darby. Oct 1940. 95p photos, drawings, graphs, table. Mi $5.40, ph $15.30. PB 123823

1. Steel castings - Fluidity 2. NRL M 1657.

Geochemical and petrographic aspects of mercury ore deposits, by Frank W. Dickson and George Tunell. California. University. Department of Geology, Los Angeles, Calif. Nov 1955. 138p photos, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 124132

Project also supported in part by National Science Foundation Grant G 762.
1. Mercury ore deposits - Geochemistry 2. Mercury ore deposits - Petrology 3. Cinnabar - Mineralogy 4. Mercury ore deposits - Mineralogy 5. Contract Nonr 233, Task Order 12, NR 081-174, Final report.

Grain size control in titanium and the effect thereon of various addition agents. Final report, by Y. C. Liu and Harold Margolin. New York University. College of Engineering. Engineering Research Division, New York, N. Y. Nov 1952. 53f photos, graphs, table. Order from LC. Mi $3.60, enl pr $10.80. PB 124519

The addition of alloying elements to iodide titanium does not appreciably affect its recrystallization tem-

perature. Alpha grain size in titanium can be readily refined by deformation and annealing. Recrystallization in the alpha-beta field refines the alpha grain size in titanium alloys containing 0.1 or 0.5% addition agent. Starting structure generally has no appreciable effect on the recrystallized grain size. The activation energies computed for recrystallization in four Ti-base alloys (0.5%C, 0.5%V, 0.1 and 0.5%Al) reduced 60% ranged from 44 to 75 kcal-per mol. RAD Project nos. TB15 and TB4-10. WAL 401/105-16 Part I. Contract DA 30-069-ORD-200.

Hazards and safety precautions in the fabrication and use of titanium, by F. D. Peterseim. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, Ohio. Jan 1957. 25p. Order from OTS. 75 cents. PB 121623

A survey was made of the literature and letter contacts were made with individual organizations to determine the extent of hazard encountered in the production, fabrication, and use of titanium. The report discusses reactions of titanium with nitric acid, fire hazards in processing titanium, hazards in preparation, storage and handling of titanium sponge, and explosive aspects of titanium powder. BMI TML R 63.

Heat-capacity measurements of titanium and of a hydride of titanium for temperatures from 4° to 15° K including a detailed description of a special adiabatic specific-heat calorimeter, by M. H. Aven, R. S. Craig, and W. E. Wallace. U. S. National Advisory Committee for Aeronautics. Oct 1956. 30p diagrs, graphs, tables. Order as TN 3787 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124368

Results of heat-capacity measurements on samples of pure titanium and of a hydride of titanium are presented and compared with calculated results. The measurements were made using a special adiabatic specific-heat calorimeter which is described in detail. NACA TN 3787.

Homogenous alloy ingots produced by consumable-electrode arc melting, by R. A. Beall, F. Caputo and E. T. Hayes. U. S. Bureau of Mines. Mar 1956. 14p photos, tables. Available free from the U. S. Bureau of Mines, Washington 25, D. C. PB 123755

Homogeneous zirconium-alloy ingots have been cast on a production basis by the consumable-electrode arc-melting process at the Northwest Electrodevelopment Experiment Station, Bureau of Mines, Albany, Oreg. This paper describes the various methods used to introduce alloying materials into the ingot and evaluates each method by the degree of homogeneity of resulting ingots, as determined in tests on sections cut from the ingots. As many as 30 or more ingots, each 6 to 10 inches in diameter and weighing 300 to 500 pounds, were melted, using each method; and, as most of them subsequently were fabricated to strip 0.1 inch thick, the test results are considered to be representative of production practice. Some of these results were presented at the 1953 Metallurgical meeting at Brookhaven National Laboratory in April, 1953. BM R I 5200. Contract AT-(11-1-140), T. O. NPO-19905.

Influence of defined small amounts of impurities on the recrystallization of aluminum, by Klaus Detert and Kurt Lücke. Brown University. Metals Research Laboratory, Providence, R. I. Mar 1956. 36p photos, diagr, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 124310

The influence of small additions (0.008 to 0.14%) of iron, copper, silicon, magnesium and silver upon the recrystallization of high purity aluminum after rolling of 40% and 90% has been investigated with the help of the X-ray method described by Nölting and Lücke. In all cases the recrystallization has been delayed by the impurities. The effect of the iron turns out to be the largest, additions of the order of 1/100 of a percent increasing the recrystallization temperature by 210°C and decreasing the rate of recrystallization by a factor up to 10^{11}. It can be shown that the effect is caused by the foreign atoms in solid solution and not by those in precipitations. AD 82016. AF OSR TN 56-103. Contract AF 18(600)-1495.

Joining of molybdenum, by William N. Platte. Westinghouse Electric Corporation. Westinghouse Research Laboratories, East Pittsburgh, Pa. Nov 1956. 85p photos, drawings, diagrs, graphs, tables. Order from OTS. $2.25. PB 121845

The use of welding atmospheres of purified argon and helium is shown to cause very little contamination of the weld metal in molybdenum fusion welds. However, the use of high purity atmospheres provides only a small improvement in ductility over welds made in welding grade argon. Increasing the carbon content of the base material within the range 0.04% to 0.06% appears to improve the ductility of the weld metal. Exploratory studies on the effectiveness of diffusion as a method of removal of nitrogen from the weld metal are discussed. The use of thermal treatment as a method of improving mechanical properties by overaging and polygonization was explored. Weld metal additions are also discussed briefly. The use of Ti and Zr as deoxidizers in vacuum sintered molybdenum is described. An exploration into the effects of residual welding stresses showed that the weld crater cracking encountered in many cases is caused by measurable stresses in the region of the weld which approximate the rupture strength of the material. AD 110570. Project 1252, Task 73022. Covers work from Jan 1955-Feb 1956 under Contract AF 18(600)-114. AF WADC TR 54-17, Part 3.

Magnetic examination of four plates from Norfolk Navy Yard, by Kenneth C. Ripley. U. S. Naval Research Laboratory. Mar 1938. 10p photo, graphs. Order from LC. Mi $1.80, ph $1.80. PB 123284

1. Steel plates - Defects - Determination 2. NRL M 1428.

Magnetic search coil explorations and ball-punch hardness measurements for Bain steel piping, by Irwin Vigness. U. S. Naval Research Laboratory. Apr 1940. 32p photos, drawings, diagr, graphs (1 fold). Order from LC. Mi $3, ph $6.30. PB 123311

1. Coils, Search - Performance 2. Pipe, Steel - Permeability 3. Tubing, Steel - Permeability 4. Tubing, Steel - Hardness tests 5. NRL O 1605.

Materials-property-design criteria for metals. Part 4: Elastic moduli, their determination and limits of application, by S. A. Gordon, R. Simon, W. P. Achbach. Battelle Memorial Institute, Columbus, Ohio. Oct 1956. 23p graphs, tables. Order from OTS. 75 cents. PB 121857

A study was made of the modulus of elasticity at elevated temperatures for several materials as it is derived from the conventional stress-strain curve and as it is derived from the determination of the velocity of propagation of elastic waves. The two methods of determination give modulus values which agree closely in regions of low stress and where time effects are unimportant. At higher stress levels, where the stress-strain relationships are not linear and where time effects are important, moduli determined by the two methods do not agree, the dynamic modulus being higher than the statically determined modulus. These differences, determined for the magnesium alloy AZ-31 and for the aluminum alloy 2024-T4 for various temperatures, are discussed with respect to their applicability to airframe design. AD 110475. Project 7360, Task 73605. Covers work from Oct 1954 - Jul 1956 under Contract AF 33(616)-2303. AF WADC TR 55-150, Part 4.

Methods for locating cracks and faults in metallic structural members and machine parts, by Herman F. Kaiser. U. S. Naval Research Laboratory. Aug 1937. 23p photos, drawing, diagr, tables. Order from LC. Mi $2.70, ph $4.80. PB 123242

1. Thorium - Radioactivity 2. Metals - Cracking tests 3. Metals - Flaws 4. Metals - Radioactivity 5. NRL M 1389.

Military specification: Titanium alloy, sheet and strip. U. S. Army. May 1955. 8p tables. Order from LC. Mi $1.80, ph $1.80. PB 124666

1. Titanium alloys - Specifications 2. MIL T 9046A.

Nitriding and carbonitriding of titanium metal and its alloys. Final technical report, by Andre Styka. Sam Tour and Company, Inc., New York, N. Y. Aug 1953. 55p photos, diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123974

The treatment of nitriding titanium and titanium alloys in dissociating ammonia and nitrogen gas has been completed. Hard adherent surfaces have been obtained. Evaluation of physical properties of resultant nitrided titanium and titanium alloy specimens such as hardness, adherence, structure, impact and tensile strength are included. A complete resume of the process is included. The carbonitriding of titanium and titanium alloys was investigated. Mixtures of propane, air and ammonia gas were utilized in all experiments. The effect of temperature, time and gas mixture on hardness and case characteristics were studied. O. O. Project TB4-15. Report no. 10315. WAL 401/49/23.

Relation of heat treatment to the dynamic properties of some carbon steels, by R. C. Smith. U. S. Naval Research Laboratory. Nov 1956. 16p photos, drawings, diagr, graphs, tables. Order from OTS. 50 cents. PB 121514

SAE 1035 and 1045 specimens that had been annealed or quenched and tempered were subjected to static or dynamic axial loads. The dynamic yield stress was a maximum for specimens tempered in the range from 800° to 1100°F. The ductility is generally higher for the dynamic tests than for the static tests. The ratio of dynamic yield stress to static yield stress is smaller at the lower tempering temperatures. A possible mechanism for describing the influence of heat treatment upon the yield and flow characteristics is discussed. NRL R 4846.

Relation of water from humid atmospheres on the corrosive action of foreign deposits on aluminum and its alloys, by Thomas P. May. U.S. Naval Research Laboratory. Feb 1941. 22p tables. Order from LC. Mi $2.70, ph $4.80. PB 123300

1. Aluminum alloys - Corrosion resistance 2. NRL P 1695.

Relationship of hardness measurements to the tensile and compression flow curves, by R. E. Lenhart. General Electric Co. Research Laboratory, Schenectady, N. Y. Jun 1955. 14p graphs. Order from OTS. 50 cents. PB 121144

The approximation of a uniaxial tensile stress flow curve from hardness measurements is possible by utilizing certain empirical conversion constants. Agreement of the tensile and hardness testing methods is possible upon metals such as aluminum, copper, and steel. However, magnesium is not amenable to such a conversion of testing procedures. The presence of profuse twinning at low stress levels is believed to be the reason for unfavorable

results in magnesium. Project no. 7351, Task no. 70627. AF WADC TR 55-114. Contract AF 33(616)-2120.

Report on studies in steel castings research, by C. W. Briggs and R. A. Gezelius. U. S. Naval Research Laboratory. Oct 1936. 12p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 122695

1. Steel castings - Research 2. NRL M-1319.

Research of the weldability of iron alloys (summary report), by W. H. Bruckner. U. S. Naval Research Laboratory. Jan 1938. 61p photos, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123279

For third partial report see PB 120656.
1. Welds - Tests 2. Iron alloys - Welding 3. NRL M 1419.

Some electrical properties of germanium at low temperatures, by F. J. Darnell and S. A. Friedberg. Carnegie Institute of Technology. Dept. of Physics, Pittsburgh, Pa. Jun 1955. 155p drawings, diagrs, graphs, tables. Order from LC. Mi $7.50, ph $24.30. PB 124180

The resistivity and Hall coefficient of single crystal and polycrystalline germanium of varying impurity concentration, n- and p-type, have been measured as functions of temperature from 300°K down to 0.2°K for resistivity and 1.3°K for Hall coefficient. Magnetoresistance of the single crystal samples was studied at several temperatures and for various orientations of the magnetic field with respect to the current and crystal directions. The nonohmic behavior of resistivity in the helium and hydrogen regions was studied in some detail. Experimental results are interpreted with a model in which conduction in impurity levels becomes quite appreciable at low temperatures. Techniques of adiabatic demagnetization used to obtain temperatures below 1°K are described, and the selection and calibration of resistance thermometers for use in this range are discussed. Based on thesis by F. J. Darnell. Contract Nonr-760(05), Technical report no. 1.

Static corrosion of nickel and other materials in molten caustic soda, by J. N. Gregory, N. Hodge, and J. V. G. Iredale. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Mar 1956. 15p photo, graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 55 cents. PB 123629

Unclassified. R.C.T.C. P/62. S. O. code no. 91-3-2-61.
1. Sodium hydroxide - Containers - Materials - Gt. Brit. 2. Sodium hydroxide - Solvent effects - Gt. Brit. 3. Nickel - Corrosion tests - Gt. Brit. 4. Nickel - Low temperature properties - Gt. Brit. 5. Nickel alloys - Corrosion tests - Gt. Brit. 6. Nickel alloys - Low temperature properties - Gt. Brit. 7. Zirconium - Corrosion - Gt. Brit. 8. Reactors, Materials - Research - Gt. Brit. 9. AERE C/M 272.

Steel casting design for the engineer and foundryman, by C. W. Briggs, R. A. Gezelius and A. R. Donaldson. U. S. Naval Research Laboratory. Jan 1938. 84p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 123280

1. Steel castings - Design 2. NRL M 1420.

Study of freezing segregation in titanium alloy ingots, by J. W. Holladay. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, Ohio. Jan 1957. 52p diagrs, graphs, tables. Order from OTS. $1.50. PB 121606

Nonuniformity of mechanical properties and of homogeneity of chemical composition in titanium alloy semimanufactures are problems of concern to the industry. A theoretical study was undertaken, therefore, to determine whether the nonuniformity might be attributable to freezing segregation. The theories of normal freezing and of zone melting were applied to titanium alloy ingots produced by consumable-electrode melting in a cold-mold furnace, and to ingots produced by casting from a skull furnace. The results of the theoretical analysis are compared with the limited amount of available experimental data. Appendix A is Theoretical analysis of freezing segregation in titanium alloys. BMI TML R 62.

Study of permanent magnets of the barium ferrite type, by K. J. Sixtus. Indiana Steel Products Company. Magnetic Research Laboratory, Valparaiso, Ind. Aug 1956. 53p photos, diagrs, graphs, tables. Order from OTS. $1.50. PB 121865

Permanent magnets of the barium-ferrite type were investigated to improve the magnetic properties of the material and to add to the knowledge of the magnetization process. Magnets of the approximate composition $BaO{:}6\,Fe_2O_3$ were prepared which had over 3.7 million gauss x oersted energy products. Various compositions of the ceramic together with some additions were experimentally tried. The numerous steps in the preparation of oriented magnets were investigated to obtain better magnets. Other magnetic phenomena related to barium ferrite were also studied. Powder patterns of barium ferrite were studied with the aid of photomicrographs. The patterns were classified and a possible mechanism of magnetization reversal was proposed. AD 110551. Project 7080, Task 70650. AF WADC TR 56-198. Contract AF 33(616)-267, Supplemental agreement S2(54-297).

Study of transformation characteristics of weld metals and base metals. Second interim techni-

cal report under Contract DA -30-115-ORD-250, by Ernest F. Nippes and Edward C. Nelson. Rensselaer Polytechnic Institute. Research Division, Troy, N. Y. Feb 1955. 72f photos, diagr, graphs. Order from LC. Mi $4.50, enl pr $13.80. PB 124520

Continuous cooling transformation diagrams have been determined for Ni-Cr steel austenitized at 1800°F, 2000°F, 2200°F, and 2400°F, and for three types of weld metals austenitized at 1800°F. O. O. Project TB4-31A. WAL 642/156-21.

Thermal acceptors in germanium, by Harry Lethaw, Jr. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Aug 1955. 41p diagr, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 123128

Thermal acceptors are identified as vacancies with an energy of formation of 2 ev. The annealing of thermally introduced acceptors in germanium is described by a mechanism involving the formation of divacancies as the first step. The second step of the annealing process involves the formation of clusters of four, the activation energy of formation of which is 2.8 ev. Further annealing takes place through the formation of clusters of higher order. The behavior of the mathematical model is compared to experiments reported by others. Technical report no. 7 under Contract N6 ori-07410, NR 072-161; Technical note no. 1 under Contract AF 18-(600)-1310, Task 47502.

Use of chaplets in steel castings. Progress report II, by H. F. Taylor, E. A. Rominski and A. R. Donaldson. U. S. Naval Research Laboratory. Apr 1940. 23p photos. Order from LC. Mi $2.70, ph $4.80. PB 123310

For previous report see M 1561.
1. Chaplets - Coatings, Corrosion resistant 2. Steel castings - Manufacture 3. Coatings, Corrosion resistant 4. NRL M 1609.

METEOROLOGY AND CLIMATOLOGY

Anomalies in the northern hemisphere 700-MB-5-day-mean circulation patterns, Part I. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. Apr 1956. 29p map, tables. Order from LC. Mi $2.70, ph $4.80. PB 123040

This report is based on studies made by Lt. Col. D. E. Martin, which led to the technique of forecasting large-scale pressure patterns by means of anomaly charts. Various types of charts made and results of Martins' experiments to determine their utility in extended forecasting are described. Suggestions for use of the charts in both 5-day forecasting and 24-72 hour forecasting are described. AF AWS TR 105-100/1.

Climates of Africa and India according to Thornthwaites' 1948 classification, by Douglas B. Carter. Johns Hopkins University. Laboratory of Climatology, Seabrook, N. J. 1954. 46p maps (part fold), graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 123205

Work on Contract Nonr-248(40) has been directed toward the preparation of detailed climatic maps of Africa and the Indian sub-continent after the system of classification devised by Thornthwaite in 1948. To complete the work required, climatological records for more than 1200 selected stations in Africa and 400 stations in India and vicinity were collected, analyzed, and tabulated. Water balances for each station were derived from the climatic data alone using methods introduced by Thornthwaite. From such calculations, detailed estimates of potential evapotranspiration, actual evapotranspiration, soil moisture utilization, water surplus, and water deficiency were obtained. In addition, the moisture type and thermal efficiency of the climate were determined at each station. Climatic maps at a scale of 1:5,000,000 of average annual potential evapotranspiration, water deficiency, water surplus, the moisture regions, and precipitation were prepared for Africa and India. The large-scale climatic maps could not be reproduced inexpensively for inclusion with this report so small-scale maps giving the general outlines of the patterns shown on these more detailed maps were prepared and are included as plates I and II. Maps of precipitation are included in the text for comparison with the other elements of the water balance. Descriptions of each of the maps are provided. Publications in Climatology, vol. VII, no. 4. Contract Nonr-248(40), NR 389-091, Final report.

Concerning the mechanics of hurricanes, by Richard L. Pfeffer. Massachusetts Institute of Technology. Dept. of Meteorology. May 1956. 27p diagrs, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 123120

1. Hurricanes - Development 2. Atmosphere - Turbulence - Meteorological aspects 3. Contract AF 19(604)-1000, Scientific report 4 4. AF CRC TN-56-483 5. MIT MET SR 4.

Construction and use of forecast registers, by Irving I. Gringorten, Iver A. Lund and Martin A. Miller. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Bedford, Mass. Jun 1956. 141p diagrs, graphs, tables. Order from OTS. $3.75. PB 121900

A "Forecaster Register" is essentially a record of the past weather at a station specifically designed

to provide a forecaster with a handy reference to past weather situations which closely resemble the current situation. By properly arranging the information in the registers, coding the current situation, and then matching the current situation with the past cases, it is possible to select cases out of the past which are similar to the current case. The registers were trial tested at four detachments of the Air Weather Service. Aside from forecasting, the registers are demonstrably useful in preparing case studies and compiling climatic data. AD 110207. AF CRC TR 56-212. AF GRD P 53.

Forecasting of aircraft condensation trails. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. Aug 1956. 20p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123672

1. Condensation trails - Forecasting 2. AF AWS M 105-100.

Geographical distribution and seasonal variation of the semidiurnal pressure oscillation in high latitudes, by Gloria M. Sepulveda and B. Haurwitz. New York University. College of Engineering. Research Division. Department of Meteorology and Oceanography, New York, N Y. May 1956. 46p diagrs, map, tables. Order from LC. Mi $3.30, ph $7.80. PB 124506

The amplitudes and phases of the semidiurnal pressure wave have been computed for sixteen polar stations. The data were analyzed to obtain a picture of the geographical and seasonal variation of this oscillation in the polar regions. A simple expression is given for the geographical distribution of the annual mean of the standing semidiurnal pressure oscillation in polar latitudes. Scientific report no. 2. Project 299. AF CRC TN 56-482. Contract AF 19-(604)-1006.

Heavy primary cosmic radiation at a geomagnetic latitude of 10 degrees north, by Robert E. Danielson. Minnesota. University. Dept. of Physics, Minneapolis, Minn. Jun 1955. 73p diagrs, graphs, table. Order from LC. Mi $4.50, ph $12.30. PB 124160

Thesis - University of Minnesota.
1. Cosmic radiation - Measurements 2. Cosmic radiation - Measuring equipment 3. Cosmic radiation - Theory 4. Geomagnetism - Theory 5. Contract N6 onr-246.

Investigation of atmospheric radio noise. Scientific report no. 10 for the period 1 Oct-31 Dec 1955 under Contract AF 19(604)-876, by A. W. Sullivan, S. P. Hersperger, R. F. Brown and John Marshall Downey. Florida. Engineering and Industrial Experiment Station. Dept. of Electrical Engineering, Gainesville, Pa. Jan 1956. 101p graphs. Order from LC. Mi $5.70, ph $16.80. PB 123165

Studies of the characteristics of atmospheric noise have led toward the formulation of a mathematical model for certain statistical measures of the atmospheric noise as it appears at the output of a communications receiver. Although the model developed here differs from measures obtained experimentally, it does offer a good approximation for small values of the variable. Additional work has been done in analyzing the probability distribution of the peak amplitudes of atmospheric waveforms as observed near the source and at a distance of 380 miles. A bibliography of references pertaining to atmospheric waveforms and their generation is included in this report. For 1st-9th reports see PB 113559, 113764, 116122, 116123, 116501, 116979, 117733, 119364 and 119807. Thesis. Includes atmospheric wave-forms bibliography in three parts. AF CRC TN 56-152.

Investigation of microseisms, by B. Gutenberg and H. Benioff. California Institute of Technology. Seismological Laboratory, Pasadena, Calif. Feb 1956. 42p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122353

This research was undertaken for the purpose of investigating the origin, movements and propagation characteristics of microseisms from non-tropical sources and the possibilities for their use in weather forecasting. The initial approach to the problem was made with a vectorial recorder for indicating the vector motions of the ground particles as derived from responses of two pendulums, two strain seismometers and combinations of the two types. In order to determine the direction of arrival of the microseisms being studied with the vectorial recorder, a vertical component tripartite network was also installed. Additional recorders, writing on standard paper sheets at a speed of 3 mm per second and operating for 5-minute intervals each hour, were also installed. These were arranged so that on the three sheets there were recorded simultaneously (1) two components of electromagnetic horizontal component pendulums, (2) two strain components and their added responses, (3) the three units of the tripartite net. AF CRC TR 56-257. Contract AF 19(122)-436.

Marine meteorology; an observational study and discussion of counter-gradient heat flows in the atmosphere, by Andrew F. Bunker. Woods Hole Oceanographic Institution, Woods Hole, Mass. Aug 1955. 32p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123005

Heat flow and turbulence measurements have been made in a stable atmosphere during an airplane flight to Bermuda. These observations are discussed in relation to prevalent heat flow theories. The Priestley (1954) theory of heat transfer due to impressed temperature fluctuations gives the best agreement with the observations, but predicts heat flows that are too small. A modification of the assumptions concerning the height variation of the impressed temperatures is suggested which leads

to a better agreement with the observed heat flows. It is pointed out that a theory that embraces all the observed features of a stable air mass heated from below is still lacking. Unpublished manuscript. WHOI Ref 55-38. Contract Nonr-1721(00), NR-082-021, Technical report no. 35.

Measurements and estimates of sky brightness for all altitudes of the sun for various altitudes of the observer above the surface of the earth, by E. O. Hulburt. U. S. Naval Research Laboratory. Feb 1957. 15p tables. Order from OTS. 50 cents. PB 121661

Measurements of brightness of the day sky, twilight sky, and night sky are tabulated for the upper hemisphere and the lower hemisphere. Reprint of an informal report to the U. S. Armed Services - National Research Council Vision Committee. Dec 1951. NRL R 4870.

Monthly means of sea level pressure for a grid of intersections of latitude and longitude over the North Atlantic Ocean from Dec 1880 to Nov 1899, by A. Hofman. Forschungsabteilung des Deutschen Wetterdienstes, Frankfurt/Main, Germany. Jul 1955. 167p map, tables. Order from LC. Mi $7.80, ph $25.80. PB 124135

1. Atmosphere - Pressure tables 2. Tables, Meteorological 3. Weather charts - North Atlantic Ocean 4. Meteorology, Marine 5. Contract AF 61(514)-646-C, Scientific report 1 6. AF CRC TN 55-860.

On verification of prognostic charts, by Sverre Petterssen. Chicago. University. Dept. of Meteorology. Mar 1956. 15p tables. Order from LC. Mi $2.40, ph $3.30. PB 123122

Data obtained from a forecasting experiment conducted in January and February 1956 are analyzed and various measures of accuracy compared. The need for systematic tests and comparison between different forecasting techniques is stressed. The report recommends that the tabulation of verification measures include the correlation skill score and the root-mean-square error pertaining to the predicted pressure field. AF CRC TN 56-290. Contract AF 19(604)-1293, Scientific report 9.

Optical studies of atmospheric turbulence. Final report, by A. J. Gardiner, H. L. Giclas, F. Gifford, Jr., H. L. Johnson, R. I. Mitchell and A. G. Wilson. Lowell Observatory, Flagstaff, Ariz. Jun 1956. 54p photos, drawings, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123119

The central studies conducted under the present contract were concerned both with the properties of telescopic images which are atmospherically induced, and with the probable nature of their causes. Scintillation, image motion, and image quality were observed by various electronic and photographic techniques, and the dependence or independence of these observables on one another and on various physical and meteorological parameters were investigated. AF CRC TR 56-261. Contract AF 19(604)-953, Final report.

Practical aspect of tropical meteorology, by C. E. Palmer, C. W. Wise, L. J. Stempson and G. H. Duncan. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Atmospheric Analysis Laboratory, Cambridge, Mass. Sep 1955. 206p drawings, diagrs, graphs, tables. Order from LC. Mi $9.30, ph $31.80. PB 124124

The report is in seven parts. After a short introduction, the manner in which the tropical forecaster may utilize climatological information is discussed. The next section emphasizes that the approach to the evaluation of tropical data is different from that which is standard in high latitude meteorology. Then follows a long discussion of wind analysis, using streamlines and isotachs. The fifth section covers methods of analyzing cloud and weather distribution; the methods outlined here are designed specifically for use in tropical regions. The sixth section deals with problems of correlation of wind and weather patterns, of continuity and with related topics; the material is presented chiefly in the form of practical examples. Finally, the structure, genesis and movement of tropical cyclones are briefly discussed. AF CRC TN 55-220. AF GRD SG 76.

Topics in statistical meteorology, by Leith Holloway, Anatol W. Holt, John W. Mauchly and Max A. Woodbury. Pennsylvania. University. Institute for Cooperative Research, Philadelphia, Pa. Jun 1955. 28p tables. Order from LC. Mi $2.70, ph $4.80. PB 124003

This report summarizes information in pressure patterns by factor analysis, including a factor analysis program for the Univac; discusses distribution of information estimates; and gives tables on amplitude variations in 12-hour oscillations of barometric pressure and air temperature at Batavia. Final report of the Meteorological Statistics Project, Contract Nonr-551(07), NR 082-113. Includes abstracts of Technical reports 1-2.

Wind, temperature and their variabilities to 120,000 feet, by Adam B. Kochanski. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. May 1956. 39p map, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123670

Report no. 9 in series which presents background material to AWS Manual 105-50 "Forecasting

upper-level winds"
1. Atmosphere, Upper - Temperature - Measurement 2. Atmosphere, Upper - Turbulence - Measurement 3. AF AWS TR 105-142.

ORDNANCE AND ACCESSORIES

Application of probability theory to explosive-ignitions phenomena, by Ransom B. Parlin and J. Calvin Giddings. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Sep 1955. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123736

The problem of explosive ignition concerns itself both with the probability of occurrence of local energy fluctuations and with the transition of these disturbances into a combustion or detonation wave. The former concept does not appear to have been comprehensively discussed; a treatment of this process is presented here. The theory is applied to several cases of impact ignition, both with and without grit particles and it is found to be in good agreement with experiment. Information is obtained through application of the theory concerning the nature and location of the local disturbances responsible for ignition. UU ISRP TR 17. Contract N7 onr-45103, NR051-192.

Development and testing of bomb whistles, by W. Wathen-Dunn. U. S. Naval Research Laboratory. Nov 1941. 26p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 120598

Unclassified 7 May 1946.
1. Whistles, Bomb - Tests 2. NRL S 1802.

Ionization measurements in the immediate neighborhood of detonating explosives, by Jacob Savitt and Richard H. F. Stresau. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1951. 15p diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 124840

The electrical properties of the ionized regions in the immediate neighborhood of detonating lead azide were examined. The experimental procedure and the results of measurements are described. A possible explanation is presented. NAVORD 2132.

Study of erosion products in gun barrels. Rensselaer Polytechnic Institute. Dept. of Metallurgical Engineering, Troy, N. Y. Contract DA 30-115-ORD-380. Dept. of the Army project 593-08-24. O. O. project TB 4-161. Order separate parts described below from LC, giving PB number of each part ordered.

First interim report, by Malcolm J. Fraser and Arthur A. Burr. n.d. 32p photos, diagrs, table. Mi $3, ph $6.30. PB 124194

During this period investigations were carried out to determine the possibility of retaining austenite in a typical steel used in ordnance material, to determine the nature of the non-metallic compounds in the base steel, and to produce eroded surfaces in vent plug apparatus. Correlation studies were made with work on erosion at Stanford Research Institute and the Jet Propulsion Laboratory. Unclassified 2 Feb 1956. WAL R 731/385-6.

Second interim report, by Malcolm J. Fraser and Arthur A. Burr. n.d. 60p photos, diagrs, graphs, tables. Mi $3.60, ph $9.30. PB 124195

A vent plug device called the Enfield apparatus was used extensively for the production of synthetically eroded specimens of steel which were studied by X-ray and metallographic analysis. Decomposition of gun-bore austenite is discussed and interpreted. Unclassified 2 Feb 1956. WAL R 731/385-13.

Third interim report for the period 1 Dec 1953 to 30 Jun 1954, by Robert D. Lupi and Arthur A. Burr. Aug 1954. 41p photos, graphs, tables. Mi $3.30, ph $7.80. PB 124196

Investigation of the kinetics of the isothermal transformation of retained austenite produced during high-temperature, high pressure erosion of steel covered a range of temperatures varying from 600°F. to 1300°F. X-ray spectrometric methods were used to determine the relative amounts of austenite and ferrite in the specimens after each heat treatment. Heat treating intervals were of the order of two-minutes. The intensity ratio of austenite and ferrite was plotted against time, at each temperature, to determine the transformation beginning and ending times. From these data an isothermal transformation diagram was determined. Includes part of a thesis by Robert D. Lupi. Unclassified 2 Feb 1956. WAL R 731/385-18.

Fourth interim report for the period 1 Jul 1954 - 1 Jan 1955, by R. D. Lupi, M. J. Fraser and A. A. Burr. Jan 1955. 35p graphs, tables. Mi $3, ph $6.30. PB 124193

A preliminary investigation of the effect of carbon content was made, a chromium and manganese series was studied, the possible effect of boron content was investigated, a test was made on specimens machined from Stellite 21, and a nitride line was observed and measured. Weight loss per round was plotted for each steel series and the intensity ratio of the austenite and ferrite diffrac-

tion lines was plotted as a function of the number of rounds for each steel. Varying vent sizes were used to study the effect of vent size. Unclassified 2 Feb 1956. WAL R 731/385-22.

PERSONNEL APTITUDE TESTING

Adaptability screening of flying personnel: Research on the McKinney reporting test, by John R. Barry, Samuel C. Fulkerson and Saul B. Sells. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Mar 1956. 8p diagr, tables. Order from LC. Mi $1.80, ph $1.80. PB 123666

The McKinney Reporting Test, a 315-item, paper-and-pencil test requiring simple perceptual-motor responses under nonspeeded and speed-stress conditions, was administered to 428 co-pilots entering B-29 combat crew training as part of an experimental personality screening battery. The criteria for these studies were various measures of adjustment in training. A scoring procedure was developed and cross-validated which permitted the accurate screening of a significant proportion of the research samples. The findings justify the further consideration of this test as part of an operational screening battery. AF SAM R 56-5.

Airmen's proficiency school, an approach to the problem of adaptation and motivation in the Air Force, by Carson Y. Nolan, Forrest R. Ratliff and Harold W. Richey. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. May 1956. 18p tables. Order from LC. Mi $2.40, ph $3.30. PB 124127

Project 7950. Task 79507.
1. Attitude surveys 2. Personnel, Flying - Psychological records 3. AF PTRC TN 56-57.

Development of a measure of complex motivation, by Elizabeth G. French. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Apr 1956. 15p. Order from LC. Mi $2.40, ph $3.30. PB 124131

In order to provide an easily administered measure of motivation which would be useful over a wide ability range, a test consisting of verbal stimulus items to which the subject gave projective answers was constructed. Scoring categories were developed and defined until satisfactory inter-rater agreement was obtained. This report describes the development of a measure of complex motivation which has been shown, in other studies, to predict behavior under various conditions where motivation is assumed to be involved. Project 7704, Task no. 77101. AF PTRC TN 54-48.

Development of a test battery for joint selection of AFROTC and AROTC cadets, by Ernest C. Tupes. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas. Nov 1955. 36p tables. Order from LC. Mi $3, ph $6.30. PB 123957

A joint Air Force-Army research study, designed to provide a valid test battery of leadership ability suitable for the screening of applicants for ROTC scholarships, was undertaken. An experimental battery of 13 predictor instruments was administered to nearly 2300 senior (Class of 1953) AFROTC and AROTC cadets at six colleges and data on two criterion measures (leadership ability and achievement in military science courses) were obtained. Validities and cross validities were computed for each predictor against each of the two criteria. AF PTRC TN 55-41.

Development of motivation keys for the Armed Forces Qualification Test, Forms 3 and 4, by Jane McReynolds. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. May 1956. 22p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 124123

Project no. 7700, Task no. 77000.
1. Armed Forces Qualification test 2. Psychological tests 3. AF PTRC TN 56-60.

Follow-up and comparison of three groups of Navy enlisted men: Marginal-and-illiterate, marginal-but-literate, and typical recruits, by Lloyd S. Standlee. Indiana. University. Institute of Educational Research, Bloomington, Ind. Jul 1954. 128p tables. Order from LC. Mi $6.30, ph $19.80. PB 123051

Few data have been reported on the ultimate criterion of success--performance of military duties. The present study was designed to obtain measures of this ultimate criterion. The high internal consistency of the data, plus a consistency with what one might expect, indicates that the data have satisfactory reliability. Appendices A and B consist of questionnaire forms. NAVPERS TB 54-20. PA 3018.3.1.

Naval aviator and reserve participation, by George E. Rowland, Merle K. Miller and Douglas Courtney. Research Associates, Philadelphia, Pa. Jun 1955. 174p drawings, tables. Order from LC. Mi $8.10, ph $27.30. PB 124005

1298 Naval aviators were interviewed. This report presents data from the interviews and recommendations for making the Naval Reserve more effective as well as methods of making Reserve membership more beneficial to the individual. Research Associates Report 5, Project B. Contract Nonr-1454(00).

Nontechnical factors in the job performance of aircraft mechanics: Study II, by Howard J. Hausman and Solomon C. Goldberg. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. May 1956. 30p graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 124125

For previous report see PB 113181. Project no. 7950, Task no. 79507.
1. Mechanics, Aeronautical - Ability tests
2. Psychological tests 3. AF PTRC TN 56-59.

Relationship between attitudes of bomber crews in training and their attitudes and performance in combat, by Dorothy M. Knoell. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Texas. Apr 1956. 51p tables. Order from LC. Mi $3.60, ph $9.30. PB 124130

The present study was made to assess the stability of crew attitudes from the training to the combat situation. The study was designed also to provide additional information concerning; (a) relationships found in an analysis of 1952 combat crew attitudes and crew performance, and (b) the combat attitude scales used in that study. See also PB 124113. Project no. 7713, Task no. 77220. AF PTRC TN 56-49.

Research into basic methods and techniques of Air Force job analysis, IV, by Jesse C. Rupe. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Training Aids Research Laboratory, Chanute Air Force Base, Ill. Apr 1956. 57p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 124128

Project 507-015-0002.
1. Job analysis 2. Personnel, Flying - Classification 3. AF PTRC TN 56-51.

Student performance as a measure of instructional proficiency, by Wilse B. Webb and Norman D. Bowers. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla. and Tulane University, New Orleans, La. Jun 1954. 13p tables. Order from LC. Mi $2.40, ph $3.30. PB 123137

1 Instructors, Aviation - Evaluation 2. Teachers - Effectiveness 3. Education - Research 4. NMRI Proj. No. NM 001 077.01.06.

Validation of the Electronics Technician Selection Test at selected class "A" schools, by Robert L. Thorndike and Elizabeth Hagen. Columbia University. Teachers College. Apr 1955. 71p tables. Order from LC. Mi $4.50, ph $12.30. PB 123745

The present study reports the validation of the Electronics Technician Selection Test against criteria of success, typically final grade, in ten different Class A technical schools that were thought to involve in some degree the same sorts of electrical and electronic knowledge that is tuaght in the ET school. The validity of the ETST is compared in each case with the validity of the tests in the Navy Basic Battery. Multiple correlations are shown, indicating how much the ETST has added to the prediction possible from the Basic Battery tests alone. NAVPERS TB 55-3. Contract Nonr-644(02).

PHOTOGRAPHIC AND OPTICAL GOODS

Accuracy of the gamma-radiography exposure slide rule specification of film for gamma radiography, by Herman F. Kaiser. U. S. Naval Research Laboratory. Sep 1940. 20p tables. Order from LC. Mi $2.40, ph $3.30. PB 123299

1. Films (photography) - Sensitivity 2. Radiography - Photographic aspects 3. NRL M 1653.

Chemical treatment of silver chloride sheets to produce filters transmitting the far infra-red, by P. S. Smith. U. S. Naval Research Laboratory. Jun 1944. 11p graphs. Order from LC. Mi $2.40, ph $3.30. PB 120586

Unclassified 6-6-46.
1. Filters, Infrared 2. Coatings, Silver sulphide - Preparation 3. NRL H 2339.

Detachable sun glare shield, by Francis C. Keil and Paul A. Campbell. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jan 1943. 9p photos, drawing. Order from LC. Mi $1.80, ph $1.80. PB 124041

Unclassified 15 Aug 1945.
1. Glare - Elimination 2. Sunlight, Reflected - Dazzle 3. Aircraft - Identification 4. AF SAM Proj. 107, Report 1.

Geographic method of aerial photographic interpretation, by Clyde F. Kohn and William E.

Powers. Northwestern University. Dept. of Geography, Evanston, Ill. May 1955. 76p photos. Order from LC. Mi $4.50, ph $12.30. PB 124030

This report discusses the study of geographic patterns, the use of aerial photographs in studying geographic patterns, the geographic method outlined. Five areas are used as examples: (1) The Oconomowoc area, Southeastern Wisconsin, (2) The Leelanau area of Michigan, (3) The Severing area of Michigan, (4) The great Falls area of Montana, and (5) The Yelm area of Washington. Contract N7-onr-45-055, NR 387-005, Final report.

High altitude helmet visual problems, by Harold C. Glover. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1956. 20p photos, diagrs, table. Order from OTS. 50 cents. PB 121850

An analysis is made of the various visual problems encountered in the design and usage of high altitude suit visors. The visual problems include fields of view, optical distortions, eye relief, antifogging and antifrosting. Design criteria for helmet visors are outlined in this report. AD 110543. Project 6333, Task 63617. Covers period from Aug 1951 to Aug 1956. AF WADC TR 56-572.

Improved aviation goggles, by Francis C. Keil, Jr. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1943. 6p photos, diagr, table. Order from LC. Mi $1.80, ph $1.80. PB 124043

Unclassified.
1. Goggles, Flying - Design 2. AF SAM Proj. 145, Report 1.

Review of the development of the mechanical components of the integrated micrographic system. Photogrammetry, Inc., Silver Spring, Md. Oct 1955. 37p photos. Order from OTS. $1. PB 121703

Describes the development of a system for reducing graphic material to strip film form and for producing quantities of duplicates of the strip film. Three major components are described: a camera, an automatic film processor, and a contact printer. The Automatic Film Processor is a complete unit for processing either 35 mm or 70 mm film in black and white, reversal, Ektachrome, or Anscochrome types. Relatively simple modifications to the Ozamatic duplicating printer are briefly described. Contract Nonr-1210(00).

Self diffusion of the silver ion and conductivity in silver chloride, by Walter D. Compton. Illinois. University. Dept. of Physics, Urbana, Ill. Jun 1955. 82p diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 124094

Thesis - Illinois University. Physics of the solid state, Technical report no. 16.
1. Silver ions - Structure 2. Silver chloride - Crystal structure 3. Crystals, Silver chloride - Photographic properties 4. Silver ions - Diffusion - Measurement 5. Silver chloride - Electrical conductivity - Measurement 6. Contract N6 onr-07129, NR 017-412, Technical report 16.

Tests of the graded density sun glass, Type "A" and "B" in connection with AAF Board Project J-4035, by Richard G. Scobee. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jan 1945. 5p drawing. Order from LC. Mi $1.80, ph $1.80. PB 124048

Unclassified 15 Aug 1945.
1. Glasses, Sun - Tests 2. AF SAM Proj. 358, Report 1.

PHYSICS

General

Analytical and experimental investigations of incompressible and compressible mixing of streams and jets, by T. P. Torda and H. S. Stillwell. Illinois. University. Department of Aeronautical Engineering, Urbana, Ill. Mar 1956. 261p photos, diagrs, graphs, tables. Order from OTS. $4.75. PB 121813

Analytical and experimental work is reported which was carried out on basic aspects of phenomena connected with mixing of incompressible and compressible, laminar and turbulent streams and jets. Previous theories have been extended by taking into account the presence of the boundary layers at the start of the mixing, which results in a closer correlation with experimental data. Some of the results presented are new, others confirm previous experimental work. The first three sections present the methods and results of analyses and the next two sections those of experiments. AD 93333. Project 1363, Task 70125. AF WADC TR 55-347. Contract AF 33(038)-21251, Final report.

Automatic matching of corresponding trajectory images for photogrammetric triangulation, by D. C. Brown. U. S. Air Force. Air Research and Development Command. Missile Test Center, Patrick Air Force Base, Fla. Apr 1956. 12p diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 123035

A method independent of coding or timing data is developed for establishing the correspondence be-

tween ballistic camera images of trajectory points prior to triangulation. The method is well suited to computation on automatic electronic computers. RCA Data reduction technical report no. 28. AF MTC TN 56-29.

Bending of a work-hardening circular plate by a uniform transverse load, by William E. Boyce. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Aug 1955. 23p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 123017

This paper contains an analysis of the bending moments and deflection of a work-hardening circular plate under the action of a uniformly distributed transverse load. A segmentwise linear yield condition and the associated flow rules are used in order to avoid the unsound features of total stress-strain laws while retaining much of their mathematical simplicity. AD 72968. GDAM C 11-1. Contract Nonr-562(10), NR 064-406, Technical report no. 1.

Decision procedures for the functional calculus. ACF Electronics. Data Processing Dept., Alexandria, Va. 1956. 48p tables. Order from LC. Mi $3.30, ph $7.80. PB 123414

The problem of applying machine techniques to the analysis of logical expressions can often be considerably simplified if it can be shown that such expressions can be expanded into a full disjunctive normal form. All expressions of the propositional calculus and the monadic functional calculus have such a normal form. A special case involving dyadic functional variables is considered in which an expansion into a full disjunctive normal form is also possible. The procedure for performing such an expansion is described, and a theorem is proved which allows the logically false disjuncts to be eliminated. Scientific report for the period 1 Mar 1956-31 May 1956 under Contract AF 19(604)-1582. AF CRC TN 56-387.

Differential equations with transition points. I: The first approximation, by A. Erdélyi. California Institute of Technology. Dept. of Mathematics, Pasadena, Calif. 1955. 23p tables. Order from LC. Mi $2.70, ph $4.80. PB 123038

Technical report 6.
1. Equations, Differential 2. Approximate computations 3. Contract Nonr-220(11), NR 043-121, Technical report 6.

Digitalization of the propositional calculus and the monadic functional calculus. ACF Electronics. Data Processing Dept., Alexandria, Va. Feb 1956. 37p tables. Order from LC. Mi $3, ph $6.30. PB 123754

The propositional calculus and the monadic functional calculus are reduced to a form which can be processed by digital computer techniques. A set of binary designation numbers is assigned in such a way that two logical expressions receive the same designation number if and only if they are logically equivalent. The various logical operations reduce to simple operations on the binary numbers, and an isomorphism exists between designation numbers and the corresponding logical functions. The process of assigning these designation numbers is referred to as digitalization. The digitalization techniques for the propositional calculus and the monadic functional calculus depend on the existence of a full disjunctive normal form for the logical expressions involved. The existence of such a form for the propositional calculus is well-known, and its immediate applicability to the problem of digitalization is shown. For the monadic functional calculus (including propositional variables and free individual variables) the existence of a full disjunctive normal form is proved, and the digitalization process is shown. Scientific report for the period 1 Dec 1955-29 Feb 1956 under Contract AF 19(604)-1582. AF CRC TN 56-176.

Direct determination of the irredundant forms of a Boolean function from the set of prime implicants, by S. R. Petrick. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Computer Laboratory, Bedford, Mass. Apr 1956. 13p tables. Order from LC. Mi $2.40, ph $3.30. PB 123405

Several authors have shown that in reducing Boolean functions to simplest disjunctive normal (sum of products) form, only certain conjunctions of literals need be considered as possible terms. The simplification of Boolean functions can be considered in two parts: determination of the prime implicants, and selection of these prime implicants to make up minimal forms. The method described in this paper locates all irredundant normal forms from which all the minimal forms may be selected, for any reasonable definition of minimality. AF CRC TR 56-110.

Elastic compliances of orthogonally stiffened plates, by W. H. Hoppmann, II. Johns Hopkins University. Dept. of Mechanical Engineering, Baltimore, Md. Jul 1955. 22p photos, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 124318

A method of analyzing the bending deformation of orthogonally stiffened plates is extended to include the effect of the deformation of the middle surface. Consideration of this aspect is essential before the method can be applied to the analysis of the large bending of an orthogonally stiffened cylindrical shell. Experiments were performed on stiffened plates so that the elastic compliances or moduli could be determined for stretching and shearing, as well as for bending and twisting. Experimental

results are given for stiffened aluminum plates of a particular design. Technical report no. 9 under Contract Nonr-248(12).

Experimental check on calculation of displacement caused by mechanical shock, by W. J. Mueller, U. S. Naval Research Laboratory. Aug 1945. 12p photos, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 122768

Unclassified 15 Dec 1953.
1. Impact - Effects 2. Impact - Models 3. Impact - Measurements 4. Structures - Shock resistance 5. Equations of motion 6. NRL V-2624.

Improved optimum free volume theory of liquids, II, Addenda, by John S. Dahler and Joseph O. Hirschfelder. Wisconsin. University. Naval Research Laboratory. Department of Chemistry, Madison, Wis. Feb 1955. 6p diagrs. Order from LC. Mi $1.80, ph $1.80. PB 119186s

Addenda to PB 119186.
1. Liquids - Volume - Theory 2. WIS ONR 15 Suppl.

Integral equation theory for the transonic flow around slender bodies of revolution at zero incidence, by F. Keune and K. Oswatitsch. Sweden. Kungl. Tekniska Högskolan. Institutionen för Flygteknik. Aug 1954. 78p diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30.

The integral equation for calculating the flow over slender bodies of revolution which are pointed at the front and rear is derived by the method of K. Oswatitsch using the gas dynamic equation for axisymmetric transonic flow. A certain function is assumed for the variation in velocity at radial distances from the body. The integral equation can thus be reduced to line integrals for calculating the velocity on the axis of the body. The integrals are analyzed into finite sums of strips of equal width. The coefficients of this numerical integration are calculated separately as matrices. Published in 1955. Appendix is tables of matrices for numerical integration. KTH AERO TN 37.

Method of pattern analysis for isolating typological and dimensional constructs, by Louis L. McQuitty. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas. Dec 1955. 43p tables. Order from LC. Mi $3.30, ph $7.80. PB 123956

This paper develops and illustrates a method of analyzing patterns of responses which permits interpretation of them as being indicative of a limited number of inferred characteristics. The method is called similarity analysis. Project no. 7700, Task no. 77016. AF PTRC TN 55-62. Contract AF 33-(038)-25726.

New method for calculating scattering, with particular reference to the circular disk, by D. S. Jones. New York University. Institute of Mathematical Sciences. Div. of Electromagnetic Research. Dec 1955. 52p tables. Order from LC. Mi $3.60, ph $9.30. PB 123406

It is shown that a solution in closed form can be obtained for the problem of finding the pressure distribution on a circular disc in an arbitrary axisymmetrical sound wave when it is assumed that the scattered field behaves like a standing wave at infinity and approaches the static limit as the wavelength becomes infinitely long. This result is used to convert the standard integral equation of the first kind, which arises when the scattered field behaves like a radiating wave, into an integral equation of the second kind. A general theory is developed of the corresponding integral equation which would arise in any scattering problem. It is shown that it is always possible to estimate the error made in finding the source distribution by solving the integral equation approximately. From this, estimates of the error in the scattered amplitude and scattering coefficient are deduced. Numerical results are given for a circular disc in a normally incident plane sound wave. AF CRC TN 56-151. NYU RR EM-87. Contract AF 19-(122)-42.

Note on numerical transform calculus, by Rubin Boxer. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, N. Y. Dec 1956. 17p tables. Order from OTS. 50 cents. PB 121827

The z-form integration operators used for the numerical solution of differential equations are extended to include initial conditions. A derivation of the method is given, in addition to numerical examples illustrating the solution of a constant-coefficient and a time-varying problem. The procedures are equally applicable to the solution of nonlinear equations. AD 97848. AF RADC TN 56-367.

On heat transfer in converging channel flows at high Prandtl number, by G. W. Morgan and W. H. Warner. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Aug 1955. 7p. Order from LC. Mi $1.80, ph $1.80. PB 123018

The method of treating heat transfer at high Prandtl numbers in laminar boundary layer flows is essentially one of obtaining the asymptotic behavior of the heat transfer coefficient on the Prandtl number by a further coordinate stretching in the thermal boundary layer equation based on Prandtl number, similar to the coordinate stretching based on Reynolds number used in the standard velocity boundary layer analysis. In this report, an example of the application of the method is given. The Hamel flow in a converging channel

with constant wall temperature is treated, and the asymptotic dependence of the local heat transfer coefficient is obtained. AD 71113. GDAM 562(07)/5. GDAM TR 5. Contract Nonr-562(07), NR 062-179, Technical report no. 5.

On the flow over a finite wedge in the lower transonic region, by Hideo Yoshihara. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aircraft Laboratory, Wright Patterson Air Force Base, Dayton, Ohio. Jun 1956. 34p diagr, graphs, (1 fold). Order from OTS. $1. PB 121712

The flow over a wedge at zero incidence and for the lower transonic region (subsonic free stream Mach numbers) is computed using the usual transonic small perturbation method in the hodograph plane. The problem as formulated can be considered to consist of a transonic boundary value problem and a supersonic initial value problem. The essential difficulty arises due to the fact that in the transonic boundary value problem part of the subsonic boundary and the condition to be prescribed there depend on the solution of the supersonic initial value problem, while the initial data for the latter must be obtained from the transonic boundary value problem. The procedure for the solution is an iterative one with the direct goal being the determination of the unknown subsonic boundary condition. In the resulting problem a special behavior of the solution is used to obtain convergence of the process. The results thus computed show excellent agreement with experiment. AD 110428. Project 1363. AF WADC TR 56-444.

Probability and statistics in item analysis and classification problems: A nonparametric solution for the k-sample slippage problem, by Edward Paulson. U. S. Air Force. School of Aviation Medicine, Randolph Air Force Base, Texas. Dec 1956. 14p. Order from OTS. 50 cents. PB 121830

The statistical procedures considered are limited to non-parametric procedures, based on ranks, which are symmetric with respect to the k populations and for which there is a fixed probability of deciding correctly that the k populations are identical. One is proposed which maximizes the probability of correctly selecting the "slipped" population, under the assumptions that the populations are actually normal and the slippage is small. AF SAM R 57-20.

Radiation intensity from a point source in a semi-infinite medium, by C. J. Tsao. Ohio State University Research Foundation, Columbus, Ohio. Apr 1956. 28p diagrs. Order from LC. Mi $2.70, ph $4.80. PB 123977

Attempts made to solve the problem of the radiation intensity from a point source in a semi-infinite medium are summarized. These include the spherical harmonics approximation and the formulation of the problem by integral equations. AF CRC TN 56-481. OSURF Proj 587, Report 5. Contract AF 19(604)-1003.

Simplified theory of turbulent fluid motion with application to the Couette flow. Part I, by Max M. Munk. Catholic University, Washington, D. C. Jun 1955. 52p graph. Order from LC. Mi $3.60, ph $9.30. PB 124097

For Part 2 see PB 124098.
1. Flow, Turbulent - Theory 2. Navier-Stokes equation of fluid motion 3. Couette flow 4. Turbulence - Mathematical analysis 5. Contract N6 onr-255, T. O. 5.

Some results in the decision theory of one - parameter multivariate polya type distributions, by John W. Pratt. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Oct 1955. 53p diagrs, table. Order from LC. Mi $3.60, ph $9.30. PB 123423

1. Random distribution - Theory 2. Decision theory 3. Probability - Theory 4. Contract N6 onr-251, T. O. III, NR 042-993 5. SU AMSL TR 37.

Studies in eigenvalue problems; Conference on partial differential equations, Summer, 1954, Kansas. University. Department of Mathematics, Lawrence, Kansas. Nov 1955. 149p. Order from LC. Mi $7.20, ph $22.80. PB 124285

AD 71882. Contents: Lecture series: - Elliptical differential equations. Boundary value problems, eigenfunction expansions and asymptotic distribution of eigenvalues, by Lars Garding. - Initial value problems for non-linear hyperbolic equations, by Peter D. Lax. - Functional spaces, functional completion and differential problems, by Kennan T. Smith. - Seminar talks: - Boundary values of functions with finite Dirichlet integral, by N. Aronszajn. - On coercive integro-differential quadratic forms, by N. Aronszajn. - An isoperimetric in equality on surfaces of variable gaussian curvature, by Alfred Huber. - Closable hermitian forms and perturbation theory, by Herbert C. Kranzer. - Spectral theory of functions on semigroups and the separation of variables, by Peter D. Lax. - New sounds in harmonic and biharmonic problems, by L. E. Payne and H F. Weinberger. - Some recent results on the exterior integration formulae for the normal hyperbolic equation, by Edwin W. Titt. Contract Nonr-58304, Technical report 14.

Tables of scattering functions for spherical colloidal particles, by William J. Pangonis and Wilfried Heller. Wayne University. Dept. of Chemistry. Computation Laboratory, Detroit,

Mich. Aug 1955. 32p tables. Order from LC. Mi $3, ph $6.30. PB 123015

This report contains corrections for the scattering functions reported in Technical Report No. 2 (PB 117034). Use of the data for the calculation of turbidities revealed only a few instances of errors which had to be expected considering the tremendous scope of the computations. It became advisable to check all the hand computed values electronically. It was decided not to substitute the electronic recomputations for the data of Technical Report No. 2 except in those cases where the old values disagreed significantly with the new ones. The present report contains all these instances of significant disagreement. The new values should be substituted for those in Technical Report No. 2. Technical report 13. Appendix to Technical report 2 (PB 117034). Contract Nonr-736(00), NR 330-027.

Theory of piecewise linear isotropic plasticity, by P. G. Hodge, Jr. Polytechnic Institute of Brooklyn. Department of Aeronautical Engineering and Applied Mechanics, Brooklyn, N. Y. Sep 1955. 61p diagrs, graphs, table. Order from LC. Mi $3.90, ph $10.80. PB 123949

The theory here proposed assumes that the initial yield condition is given by a number of linear functions of the stress variables. This may then be represented by a yield polyhedron in stress space. The stress-strain curve is assumed to consist of two straight line segments representing elastic and plastic behavior, respectively. Unclassified. Paper presented at the Colloquium on the Deformation and Flow of Solids sponsored by the International Union of Theoretical and Applied Mechanics, Madrid, Spain, Sep 1955. To be published in its proceedings. PIB AL 328. AFSWP 933. Contract Nonr-839(17), NR 360-001.

Topological method for the determination of the minimal forms of a Boolean function, by R. H. Urbano and R. K. Mueller. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Computer Laboratory, Bedford, Mass. Mar 1956. 27p diagrs. Order from LC. Mi $2.70, ph $4.80. PB 123979

The topology of the n-dimensional cube is used to reduce the problem of determining the minimal forms of a Boolean function of n variables to that of finding the minimal coverings of the essential vertices of the basic cell system associated with the given function. With the numerical easily programmed procedure given, the number of variables that can now be treated is greater than has heretofore been practical. The process bypasses the determination of the basic cells (the "prime implicants" of W. V. Quine), locating the essential vertices from which the irredundant and minimal forms are obtained. AF CRC TR 56-105.

Transformation techniques for time-varying sampled-data systems, by Bernard Friedland. Columbia University. Dept. of Electrical Engineering, Electronics Research Laboratories. Jan 1956. 45p diagrs, graph. Order from LC. Mi $3.30, ph $7.80. PB 122448

An operational method for obtaining the response of feedback systems, when the transmission functions for all components are known, is presented. W-transforms, similar to Z-transforms, are defined and used to obtain the transmission function for a cascade of components. The W-transform method is also used to find the response of feedback systems. Slowly-varying systems are considered, and an approximation which simplifies analysis for such systems is suggested. The final value theorem for fixed systems is extended to systems whose asymptotic behavior is known. It is shown that for a class of systems the asymptotic behavior can be easily determined. Stability of time-varying systems is considered. Project R-357-50-3. CU-20-56-AF-677-EE. CUN ERL TR T-13/B. Contract AF 18(600)-677.

Nuclear

Correlation of meteorological parameters with cosmic-ray neutron intensities, by J. A. Lockwood and H. E. Yingst. New Hampshire. University. Physics Dept., Durham, N. H. Jun 1956. 51p diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123168

The correlation of variations in the neutron intensity of cosmic radiation with variations in meteorological conditions has been investigated at 6262 ft and at sea level over the period from 1952 to 1955. A low energy directional neutron detector was operated during the summer months of this period to monitor the intensity of neutrons with energies < 0.4 ev. A lead-paraffin pile detector was used to monitor the moderate energy neutrons. The barometric pressure, specific humidity, atmospheric temperature, and cloud cover recorded at the given station at times corresponding to those of the low and moderate energy neutron intensities were used in the study of the effect of atmospheric conditions upon the neutron intensity. Contract AF 19(604)-75, Scientific report no. 2.

Electronic structure of atoms and molecules, by John C. Slater. Massachusetts Institute of Technology. Solid State and Molecular Theory Group. Feb 1953. 216p diagr, graphs, tables. Order from LC. Mi $8.70, ph $33.30. PB 124549

This report represents notes of an advanced course which the author offered at MIT in 1952-53. It discusses: 1. The determinantal method for atoms; 2. The hydrogen molecule; 3. The method of molecular orbitals; 4. Configuration interaction

in molecules. Bibliography of 32 pages is included. AD 8949. MIT SMT TR 3. Contract N5 ori-07856.

Energy dependence of the phase shifts in pion-proton scattering, by Jay Orear. Columbia University. Physics Department. Nevis Cyclotron Laboratories, Irvington-on-Hudson, N. Y. May 1955. 16p graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 123992

CU-80-55-ONR-110-1-Physics.
1. Atomic power - Research 2. Protons - Scattering - Theory 3. Protons - Energy measurements 4. NEVIS 11 5. R 106 6. CU 85 7. Contract N6 ori-110, T. O. 1.

Gamma ray radiography with Eastman double-backed industrial intensifying screens, by C. W. Briggs and R. A. Gezelius. U. S. Naval Research Laboratory. Feb 1938. 14p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123282

1. Radiography - Photographic aspects 2. NRL M 1424.

Migration length of neutrons in a reactor: Fourth report, by D. J. Behrens. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. 1956. 14p drawings. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 46 cents. PB 123605

S. O. code no. 91-3-2-54. For 1st-3rd reports see AERE T/R 103, 221 and 239.
1. Atomic power - Research - Gt. Brit. 2. Neutrons - Diffusion - Theory - Gt. Brit. 3. Neutrons - Fission - Gt. Brit. 4. AERE T/R 877.

Production of neutrons with a 2 MEV electrostatic accelerator, by Steven W. Ross. U. S. Naval Radiological Defense Laboratory, San Francisco, Calif. Aug 1954. 57p diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123941

The report gives a survey of the production of neutrons by means of accelerated charged particles. An introductory discussion of nuclear physics is given with emphasis on neutron production, detection, and shielding. Neutron producing reactions using charged particles are listed along with a detailed discussion of each neutron reaction. Angular distribution of neutrons and methods of measuring the neutron flux are described. Gamma ray contamination for some of the neutron sources is discussed. USNRDL TR 15.

Quarterly progress report no. 18 under Contract N5 ori-07856. Massachusetts Institute of Technology. Solid-State and Molecular Theory Group. Oct 1955. 61p graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123732

Contents: Approximate solution of Hartree-Fock equations by matrix methods, by R. K. Nesbet. - Nuclear attraction integrals, by R. K. Nesbet. - Doubly excited states of the hydrogen molecule, by H. A. Aghajanian. - Lithium hydride molecule, by A. M. Karo and A. R. Olson. - Polarization effects in the fluorine ion, by L. C. Allen. - Electronic energy of the OH molecule, by A. J. Freeman. - "Columb Hole": A short-range correlation correction, by J. Hawgood. - Electronic structure of the V-center in KCl, by L. P. Howland. - Energy bands in graphite, by F. J. Corbato. - Augmented plane wave method as applied to sodium, by M. M. Saffren. - Augmented plane wave method as applied to chromium, by M. M. Saffren. - Augmented plane wave method for iron, by J. H. Wood. - Electron-lattice interactions, by T. D. Schultz. - On the mass of the polaron, by T. D. Schultz. - Alternative formulation of the Wannier function problem, by T. D. Schultz.

Short course in radiological protection, by Health Physics Division and Isotope School. Edited by R. J. Sherwood and H. J. Dunster. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jun 1956. 103p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $2.39. PB 119908

Contents: Lecture 1. Elements of nuclear physics, by R. A. Faires. - Lecture 2. Demonstration of energy of various radiations, by B. H. Parks. - Lecture 3. Organisation of a radiation protection service, by I. S. Jones - Lecture 4. Units in radiation protection and the detection of radiation, by H. J. Dunster. - Lecture 5. Maximum permissibe levels of radiation, by A. C. Chamberlain. - Lecture 6. External radiation hazard and its control, by E. M. Flew. - Lecture 7. Control of contamination in beta-gamma laboratories, by E. J. Bennellick. - Lecture 8. Mechanism and functioning of some health physics instruments, by W. G. L. Brownrigg. - Lecture 9. Decontamination and waste disposal, by R. H. Burns. AERE HP/L 23.

Simplified treatment of asymmetric rotor problems and the microwave spectrum of ozone, by Edwin K. Gora. Providence College. Dept. of Physics, Providence, R. I. Dec 1955. 39p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 124018

A simplified formulation of the theory of the asymmetric rotor is proposed. The computational procedures required for the evaluation of both the rigid rotor energy levels and of the centrifugal distortion corrections are substantially shortened in this formulation. The methods developed are employed for the evaluation of the microwave spectrum of ozone. The molecular parameters of ozone used for this purpose have been determined from the available observational data. Discrepancies between observed and calculated frequencies

are discussed, but not explained. Numerical values are obtained and tabulated for all the transitions whose relative intensities are expected to exceed the intensity of the faintest line observed so far. The frequencies and the centrifugal distortion corrections of all the lines belonging to one sub-branch are found to depend in a simple and characteristic way upon the rotational quantum numbers. Technical report 2. Contract AF 19(604)-831.

Study of the neutron intensity in cosmic radiation, by J. A. Lockwood and H. E. Yingst. New Hampshire. University. Physics Dept., Durham, N. H. Jun 1956. 89p diagrs, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 123167

The neutron intensity has been measured at two different locations as a function of time with simultaneous recordings of meteorological data for correlation purposes. Preliminary investigations indicated that this study could be divided into two general areas: 1) the effect of variations in the meteorological conditions upon the cosmic ray neutron intensity; 2) the neutron intensity-time variations not of meteorological origin. The major portion of this study was concerned with the first area. Contract AF 19(604)-75, Final report.

PHYSIOLOGY

Anthropometry of working positions. I: A preliminary study, by H. T. E. Hertzberg, Irvin Emanuel and Milton Alexander. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio, and Antioch College, Yellow Springs, Ohio. Aug 1956. 17p photos, drawings, tables. Order from OTS. 50 cents. PB 121676

A sample of forty adult males has been measured to ascertain new body size data for various representative working positions. Measurements were taken with the body in the standing, kneeling, crawling, and prone positions. Problems are discussed, along with possible approaches for data gathering. AD 39439. Project 7214. AF WADC TR 54-520. Contract AF 18(600)-30.

Effects of graded impedance to tracheal air flow on the pattern of breathing and alveolar gas composition of man, by Fred W. Zechman and F. G. Hall. Duke University. School of Medicine. Dept. of Physiology and Pharmacology. Aero Physiology Laboratory, Durham, N. C. Jul 1956. 49p photos, diagr, graphs, tables. Order from OTS. $1.25. PB 121565

Experiments were conducted on eleven human subjects to determine the effects of four levels of air flow resistance when added independently or simultaneously to inspiration and expiration. These studies demonstrated that: (1) the primary effect of resistance to air flow is a reduction in air flow velocity and an increase in duration of the impeded phase. (2) Resistance on one phase may alter the pattern of air flow of the other phase as well. This alteration is generally an elevated maximal flow velocity. (3) The reduction in respiratory frequency, the increase in tidal volume and the increase in expiratory reserve, usually exhibited by individuals breathing in and out through resistance, is mainly associated with the impedance of expiratory flow. (4) The extra work associated with breathing through the spectrum of resistance studies increases in a linear fashion. (5) As a result of air flow impedance, pulmonary ventilation is reduced and alveolar carbon dioxide rises and oxygen tension falls. AD 97171. Project no. 7160. Covers period of work from Jan 1955 to Jun 1956 under Contract AF 33(616)-377. AF WADC TR 56-280.

Functional application of anthropometric data to the design of the workspace of PPI scope operators, by John D. Coakley, Joseph T. Fucigna and Joseph E. Barmack. Dunlap and Associates, Inc., Stamford, Conn. Jan 1953. 22p diagrs, table. Order from LC. Mi $2.70, ph $4.80. PB 123709

The dimensions and layout of PPI consoles now in production are based on the needs of operators having average body dimensions. The use of averages results in equipment unsuitable both for operators who are larger than average and for those smaller than average. Two needs assumed to be basic to the operations of a PPI scope operator are the need to see the GCI plotting board and the need to feel comfortable while operating the scope for long periods of time. With these needs as a basic consideration, compromise dimensions should be chosen to accommodate approximately the middle 95.5% of the military population. These principles are applied to the design of a PPI console and the operator's chair, and to the placement of the PPI scopes in a GCI station. AD 6164. Unclassified 8-8-56. AF WADC TR 53-3. Contract AF 28(099)-107, Supplemental Agreement no. 3. Contract AF 33(038)-18403.

Statistical comparison of the body typing methods of Hooten and Sheldon, by C. Wesley Dupertuis and Irvin Emanuel. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio, and Western Reserve University, Cleveland, Ohio. Aug 1956. 33p graphs, tables. Order from OTS. 75 cents. PB 121686

Body type component ratings made according to the standards of Hooton and Sheldon were compared in a sample of 500 Air Force flying personnel. Six subjects were given identical body type

ratings according to both systems. Regression equations are given for the relationships between the primary components, but the standard errors of estimate are too high to permit accurate equation of body type assessments on the same individual. AD 97205. Project 7214. AF WADC TR 56-366. Contract AF 18(600)-30.

Studies in respiratory physiology. Third series. Chemistry, mechanics and circulation of the lung, by Hermann Rahn. Rochester. University. School of Medicine and Dentistry. Dept. of Physiology, Rochester, N. Y. Oct 1956. 86p drawings, diagrs, graphs, tables. Order from OTS. $2.25. PB 121803

AD 110487. Project 7160. For previous reports see PB 106704 and PB 121381. Contents: A. Blood redistribution within the lung: 1. Redistribution of alveolar blood flow with passive lung distension, by H. S. Bitter and H. Rahn. - 2. The effects of bilateral, sub-total occlusion of the pulmonary arterial system on hemodynamics and gas exchange, by M. T. Lategola. - B. Gas exchange across the alveolar and tissue membranes: 3. Arterial-alveolar gas pressure differences due to ventilation-perfusion variations, by R. E. Canfield and H. Rahn. - 4. The measurement of total gas pressure in blood, by E. G. Aksnes and H. Rahn. - 5. The rate of inert gas absorption from subcutaneous gas pockets while breathing O_2, by R. E. Canfield and H. Rahn. - 6. Oxygen and carbon dioxide tension of the tissues surrounding a gas pocket, by H. D. Van Liew. - C. Lung mechanics: 7. The effects of curare on the elastic properties of chest and lungs of the dog, by W. H. Massion. Contract AF 18-(600)-17. Contract AF 33(616)-3503. AF WADC TR 56-466.

Study of human weight lifting capabilities for loading ammunition into the F-86H aircraft, by Irvin Emanuel, John W. Chaffee and John Wing. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio, and Antioch College, Yellow Springs, Ohio. Aug 1956. 18p photos, drawing, graph, tables. Order from OTS. 50 cents. PB 121687

The weight lifting ability of a sample of nineteen young men was studied. The lifting procedures were standardized and controlled in order to simulate a precise task, that of loading ammunition into the F-86H aircraft. An ammunition case with varying amounts of weight was lifted to platforms one, two, three, four, five, six, and seven feet above the floor. AD 97206. Project 7214. AF WADC TR 56-367. Contract AF 18(600)-30.

Swimming pool nuclear reactor, its characteristics, uses, and relative merits, by John B. Radcliffe, Jr. U. S. Naval Postgraduate School, Monterey, Calif. 1954. 78p photos, drawings, tables. Order from LC. Mi $4.50, ph $12.30. PB 123198

AD 49318.
1. Reactors, Neutron - Design 2. Reactors, Neutron - Operation 3. Reactors, Neutron - Theory 4. Reactors, Neutron - Safety 5. Reactors, Neutron - Uses 6. Atomic power - Research.

PSYCHOLOGY

Behavior in groups. Technical report 4: Interrelations among measurements of member and group performance, by Bernard Bass. Louisiana State University, Baton Rouge, La. Aug 1955. 24p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 124342

For reports 2-3 see PB 122311 and 123044.
1. Group behavior 2. Psychology, Social 3. Contract N7 onr-35609, Technical report 4.

Effect of target velocity and the area of error-tolerance circles upon performance in a two-dimensional compensatory tracking task, by James C. McGuire. Washington University. Laboratory of Comparative Biomechanics, St. Louis, Mo. Aug 1954. 38p diagr, graphs, tables. Order from OTS. $1. PB 121380

Human tracking performance on a two-dimensional tracking task was investigated. Both target velocity and size of target area were varied. By means of a joystick, subjects tracked a spot presented on a cathode ray oscilloscope. The instantaneous value of the error was recorded as a function of time and, in addition, was integrated over the thirty second trial duration with equipment developed for this purpose. The results obtained on ten male subjects indicate that the displayed size of target had virtually no effect on the error integrated around the center of the target. However, with error increasing monotonically and with a negative acceleration as target velocity increased, although the segment of the curve between 0.2 and 0.6 radians per second may be considered to be linear. Task no. 71550. AF WADC TR 54-431. Contract AF 33(161)-135.

Effect of variations in control-display during training on transfer to a "high" ratio, by Marty R. Rockway. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeromedical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1955. 18p graph, tables. Order from OTS. 50 cents. PB 121316

One of the parameters of continuous control systems that appears to have relevance for transfer of training is control-display (C/D) ratio. The

present study was designed to investigate the relationship between amount of transfer of a two dimensional tracking skill and degree of physical similarity between training and test ratios. Project no. 7197, Task no. 71635. See also PB 118512. AF WADC TR 55-366. Contract AF 18(600)-78.

Efficiency of verbal versus motor responses in handling information encoded by means of colors and light patterns, by Paul F. Muller, Jr. Ohio State University. Laboratory of Aviation Psychology, Columbus, Ohio. Dec 1955. 21p diagrs, graph, tables. Order from OTS. 75 cents. PB 121520

This study was undertaken for two purposes: (a) to compare the relative compatibility of verbal vs. motor response to different types of visual stimuli, and (b) to determine the effect of verbalization as a factor affecting the ability to transfer from one type of response to the other. Reaction-time data and data on information-handling rates are reported for four experimental and four control groups that made verbal (number-naming) and motor (key-pressing) responses to spatial and to color symbols. These results are discussed in relation to the general concept of stimulus-response compatibility, and several hypotheses for explaining the results are advanced. Project no. 5-(7-7192), Task no. 71596. AF WADC TR 55-472. Contract AF 33(616)-43.

Factors affecting the frequency of various final digits, by Jerome Cohen and Virginia L. Senders. Antioch College, Yellow Springs, Ohio. Nov 1954. 18p graphs, table. Order from OTS. 50 cents. PB 121396

A total of 50,000 numerical responses, obtained from an experiment on the effects of repeated exposures on scale reading, was analyzed to determine the effects of several experimental variables on patterns of number preference. These variables were: exposure time, exposure number, scale graduation, and the final digit of the pointer setting. The results are discussed in relation to other work on number preferences, and recommendations are made concerning the design of scales and the methodology of scale reading experiments. Project no. 7186, Task 71545. AF WADC TR 55-371. Contract AF 18(600)-50.

Formal and concrete thought processes, by John Keats. Princeton University and Educational Testing Services, Inc., Princeton, N. J. Aug 1955. 107p graphs, tables. Order from LC. Mi $5.70, ph $16.80. PB 123443

This project was an empirical investigation of predictions derived from a theory by Piaget concerning the development of intelligence. In particular, three content areas, arithmetic, probability and inequalities (also referred to as "comparisons") testing procedures and special statistical techniques for analysis. Thesis - Princeton University. Contract N6 onr-270-20, NR 150-088.

How industry determines the need for and effectiveness of training, by Walter R. Mahler and Willys H. Monroe. Psychological Corporation, New York, N. Y. Mar 1952. 156f graphs, tables. Order from LC. Mi $7.50, enl pr $25.80. PB 124963

The Personnel Research Section of the Adjutant General's Office of the United States Army requested that The Psychological Corporation conduct a survey of training research in business and industry. Specifically, they wanted to discover how business and industry answer the following questions: 1. How are training needs determined? 2. What are the relative merits of different training methods? 3. What are the relative merits of different training aids? 4. What has training accomplished? Three sources of information were used -- a review of the literature, a questionnaire survey of one hundred and fifty companies, and field visits to thirty selected companies. WD AGO PRS 929.

Human control dynamic analysis facility, by D. R. Craig. U. S. Navy Electronics Laboratory, San Diego, Calif. Jul 1955. 7p photos, diagr. Order from LC. Mi $1.80, ph $1.80. PB 122828

This report describes a facility designed for the dynamic analysis of human controller characteristics. It has been designed and equipped to study: 1. Simulation of the dynamics of many operating systems; 2. Controlled generation of inputs and recording of outputs; 3. Data processing by various engineering techniques. NELS R 615.

Human engineering aspects of radar air traffic control. Ohio State University. Laboratory of Aviation Psychology and Dept. of Electrical Engineering, Columbus, Ohio. Contract AF 33-(616)-43. Project 7192, Task 71596. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I: Performance in sequencing aircraft for landings as a function of control time availability, by Lowell M. Schipper and John Versace. Feb 1956. 19p diagr, graphs, tables. 50 cents. PB 121524

Principal findings of the experiment were as follows: (1) No significant differences in excess time actually taken to vector aircraft to the GCA gate resulted from variations in the five difficulty levels. (2) There was a marked improvement in performance with practice over successive blocks of problems in terms of reduced "landing" time. (3) There was no consistent trend toward increased numbers of mid-air conflicts for the shorter control times. (4) A general improvement in safety occurred with practice. (5) After the first few blocks of trials learning was very slow; even at the end of the experiment the inexperienced controllers employed in this study were greatly

inferior to professional Air Force controllers. For description of simulator used see WADC TR 54-569. AF WADC TR 56-67.

Part IV: Comparison of sector and in-line procedures, by Lowell M. Schipper, John Versace, Conrad L. Kraft, and James C. McGuire. Sep 1956. 34p drawings, diagrs, tables. $1. PB 121773

The purpose of this research program is to provide estimates of the future level of system performance that can be achieved by a judicious combination of human controllers and semi-automatic equipment, including advanced types of data aquisition, data storage, and data transfer equipment, and well-designed information displays. The class of system under investigation is that in which certain functions are performed by human controllers and other functions by semi-automatic equipment. In the present investigations it is assumed that all decisions are made by human controllers. It is further assumed that part of the information necessary to decision-making and control (e.g., ground position and address) is derived automatically and that other information (e.g., altitude) must be acquired by voice communication. In these studies the memory load on the controllers is limited primarily to the remembering of procedures and the remembering of prior decisions. AD 110528. For Part 2/3 see PB 121799. AF WADC TR 56-69.

Research on group structure and function as related to the personality characteristics and interests of group members. Assessment of leader adequacy from structured questionnaire responses of voluntary group members, by Donald W. Olmsted. Minnesota. University. Dept. of Sociology, Minneapolis, Minn. Aug 1955. 73p tables. Order from LC. Mi $4.50, ph $12.30. PB 122936

Report is divided as follows: Part I. Problems and procedures, Part II. The exploratory use of an analysis of variance model with sociological data, Part III. The derivation and test of an adjustment procedure to indicate latent response patterns, Part IV. The derivation and testing of a respondent typology. Thesis: University of Minnesota. For reports 3-5 see PB 123042-123043 and PB 124615. Contract N8-onr-66216, Technical report 6.

Review of team training problems, by Murray Glanzer and Robert Glaser. American Institute for Research, Inc., Pittsburgh, Pa. Sep 1955. 69p tables. Order from LC. Mi $3.90, ph $10.80. PB 123960

This report presents a general overview of team training procedures and problems in the Navy. It suggests some techniques for the study and improvement of team training procedures. The first part of the report deals with various alternative descriptive techniques for teams, their advantages and disadvantages. The methods that were developed to describe the activities of Navy teams are then presented. These methods are based on the consideration of the team as a communication network. This is followed by a discussion of the characteristics and problems of some typical Navy teams. The points covered include the following: characteristics of effective and ineffective teams, errors and their causes, interchangeability of men, cross-training. Contract N7 onr-37008, NR 154-079.

Sociometric index measures as predictors of medium-bomber crew performance, by Thornton B. Roby. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Texas. Apr 1956. 17p table. Order from LC. Mi $2.40, ph $3.30. PB 124113

Sociometric questionnaire data may be considered from three rather different standpoints: the inferred role behavior of referent ratees; the inferred attitudes and information with respect to the group of raters; and, the unique interactional relationships that may be implied between raters and ratees. Indexes based upon each of these approaches are derived for 30 B-29 crews in training. Relatively satisfactory validities are demonstrated for both ratee-oriented and interaction-oriented indexes. The results are discussed and several suggestions are offered for future research. AF PTRC TN 56-46.

Study of some dimensions of team performance, by Robert Glaser, Murray Glanzer and Alan W. Morten, Jr. American Institute for Research, Inc., Pittsburgh, Pa. Sep 1955. 62p diagr, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123959

This study attempts to develop a general methodology for the description and analysis of the behavior of task-oriented groups, or teams. The specific aim is the construction of a set of descriptive variables and measures which can be applied to such groups. Certain measures were found promising for the development of procedures for the improvement of team training and team operation. Contract N7 onr-37008, NR 154-079.

RUBBER AND RUBBER PRODUCTS

Infrared investigation of aging of GR-S vulcanizates, by Ronald Freeman. U. S. Arsenal, Rock Island, Ill. Nov 1955. 21p photo, diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 123199

Five organic compounds, four ketones and one acid in mixtures with simple hydrocarbons, were analyzed for their carbonyl content by infrared techniques. The results were used to determine detection and

reproducibility limits that might be expected from the analyses of small amounts of degradation products in aged rubber. The relatively small number of carbonyl groups that are produced when unsaturated vulcanizates are ozone aged and which greatly affect the physical properties are not capable of being determined readily and quantitatively by present infrared techniques. DA project 539-15-008. ORD project 593-15-008. Contents: Pt. I. Quantitative investigation of organic carbonyl compounds in mixtures with simple hydrocarbons. - Pt. II. Quantitative study of stearic acid in raw GR-S polymer. - Pt. III. Analysis of carbonyl content in cured GR-S rubber before and after aging. RIAL R 55-4303.

Research on oxidation and aging of natural and synthetic rubber. Final report under Contract no. DA 33-019-ORD-1207 for the period Feb 19, 1953 to Feb 19, 1955, by J. Reid Shelton and William T. Wickham. Case Institute of Technology. Dept. of Chemistry and Chemical Engineering, Cleveland, Ohio. Feb 1955. 48p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 124175

The present contract was particularly aimed at clarification and determination of: (1) The mechanism of the reaction of oxygen with rubber polymers and vulcanizates. (2) The mechanism of antioxidant action in rubber polymers and vulcanizates. (3) Optimum antioxidant concentrations and synergism. (4) The extent to which various factors in the preparation and storage of specimens, as well as compounding variations, affect the initial stage or oxygen absorption. Includes Case Institute of Technology Reprint no. 1178: Effect of sulfur and accelerator variation on aging, by William L. Cox and J. Reid Shelton (Reprinted from Industrial and Engineering Chemistry, Vol. 46, p. 2237-2241, Oct 1954).

Study of reaction of ozone with polybutadiene rubbers. Report no. 8, period 1 Jan-31 Oct 1955, under Contract DA-11-022-ORD-329, Supplemental agreement 5, 6, 7, 8. Augustana Research Foundation, Rock Island, Ill. Dec 1955. 90p graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 123471

The investigation of the reactions taking place during the vulcanization of GR-S rubber, and the ozone attack on these products were given special emphasis during this period. An objective of this phase of the investigation was to get information on the reactions occurring during vulcanization between components of the GR-S rubber vulcanization formula. The effect of varying the partial pressure of the low ozone concentrations on the ozone absorption by an antiozidant was investigated. Project no. TB4-521. Includes summaries of 1st-7th reports. For reports 6 and 7 see PB 114988 and 117463.

STRUCTURAL ENGINEERING

Development of a plywood stressed-skin wanigan, by D. A. Crane, J. E. Dykins, J. E. Schroeder and W. F. Burkast. U. S. Naval Civil Engineering and Evaluation Laboratory, Port Hueneme, Calif. Jul 1955. 15p photos. Order from LC. Mi $2.40, ph $3.30. PB 122605

This report includes the development and evaluation of the Mark IV and Mark V wanigans, lightweight shelters which can be knocked down and which can be easily assembled and mounted on a sled, as required for polar tractor-train operations. AD 70719. Project YD 013-1. NCEREL TN N-227.

Evaluation of porous materials for boundary-layer control, by David E. Debeau. Battelle Memorial Institute, Columbus, Ohio. Nov 1956. 160p photos, drawing, diagrs, graphs, tables. Order from OTS. $4. PB 121851

Criteria were determined from designers for comparing various commercial permeable sheet materials for use in boundary-layer control associated with high-lift systems. Sintered metal powders, special woven and sintered wire materials, a compressed glass-fiber product, woven wire cloths, and perforated metal sheets were evaluated and compared for the following properties: average permeability, uniformity of permeability, resistance to clogging and corrosion, mechanical properties including room temperature tensile strength, modulus of elasticity, Poisson's ratio, and minimum bend radius. An evaluation of economic factors, including production facilities, product limitations, requirements for an availability of raw materials, and cost of product, was carried out on those permeable sheet materials which attained most nearly the physical and mechanical properties desired by the aircraft designers. AD 110582. Project 7351, Task 73512. Covers work conducted from Nov 1954 - Sep 1956 under Contract AF 33(600)-28835. AF WADC TR 56-486.

Minimum-weight design of a portal frame, by William Prager. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Sep 1955. 15p graphs. Order from LC. Mi $2.40, ph $3.30. PB 123965

The present paper is concerned with the minimum-weight design of frames under the assumption that the unit weight of a structural member is proportional to the α-th power of its fully plastic moment, the positive exponent α being smaller than unity. For $\alpha = 2/3$, a chart is developed that gives, at a glance, the minimum weight design for various geometries and loading conditions of a portal frame.

GDAM C11-2. Contract Nonr-562(10), NR064-406, Technical report 2.

Scale model tests for high pressure high temperature steam piping. Third partial report, by Irwin Vigness and Eugene Pardue. U. S. Naval Research Laboratory. Dec 1941. 42p photos, diagrs (1 fold), tables. Order from LC. Mi $3.30, ph $7.80. PB 122731

1st-2d partial reports issued as O-1684 and O-1749.
1. Steam pipe lines - Models - Tests 2. NRL O-1829.

TEXTILES AND TEXTILE PRODUCTS

Development of static line webbing for the T-10 parachute system, by Peter Y. Stanton. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1956. 38p diagr, graphs, tables. Order from OTS. $1. PB 121848

A silk webbing and a linen webbing were developed along with six nylon webbings each of which had a different elongation. The use of silk in static line webbing does not appear feasible because of the unavailability of raw silk. The use of linen in static line webbing was unsatisfactory because of the low elongation, low energy absorption qualities of linen. The developed nylon webbings appear satisfactory for use as static line webbing. AD 110570. Project 6071, Task 73291. Covers work from Mar 1955-May 1956. AF WADC TR 56-257.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Automatic flare-out for landing, by David Markusen, Robert McLane and Orville Pomeroy. Minneapolis-Honeywell Regulator Co. Research Division, Minneapolis, Minn. Mar 1956. 146p diagrs (1 fold), graphs. Order from OTS. $3.75. PB 121383

This report summarizes the general considerations necessary to provide acceptable touchdown behavior terminating an ILS approach. The control equation is formulated, and a chronological discussion of several compensation refinements is given. A comprehensive group of REAC recordings of system parameters is included to provide the reader with a quick comparison of the characteristic behavior of the various control configurations. Some frequency response and root-locus studies are discussed and plots included. Limited flight test results and a discussion of the computer configurations are also included. Project 1364, Task 70516. Fourth in a series of four final reports on Contract AF 33(038)-22893. First-third are Minneapolis-Honeywell report AD 5042 - TR 4, vols. 1-3. AF WADC TR 55-506.

Charts for estimating the hovering endurance of a helicopter, by Robert A. Makofski. U. S. National Advisory Committee for Aeronautics. Oct 1956. 15p graphs, table. Order as TN 3810 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124376

1. Helicopters - Hovering 2. NACA TN 3810.

Determination of emissivity and reflectivity data on aircraft structural materials. Part I: Techniques for measurement of total normal emissivity and reflectivity with some data on copper and nickel, by Howard T. Betz, O. H. Olson, B. D. Schurin and James C. Morris. Armour Research Foundation, Chicago, Ill. Oct 1956. 51p photos, drawings, diagrs, graphs, tables. Order from OTS. $1.50. PB 121817

Equipment has been designed, constructed, and calibrated for the measurement of total normal emissivity in the range -300°F to + 3000°F. The procedure consists in comparing the total normal radiance of a sample to that of a comparison blackbody, the ratio of the signals being taken as the emissivity. A thermistor detector is used in conjunction with a folded optical system to record the radiation which is chopped at 16 cps. Measurements of the total normal emissivity for a limited number of samples have been completed. An integrating sphere reflectometer is used to measure spectral reflectivity from 0.3 microns to 3.0 microns. Spectral reflectivity data can be combined with solar spectral energy data for any location to obtain the solar absorptivity at that point. AD 110458. Project 7360, Task 73603. Covers work from May 1955 to May 1956 under Contract AF 33(616)-3002. AF WADC TR 56-222, Part 1.

Impact tests of flexible nonmetallic aircraft fuel tanks installed in two categories of simulated wing structures, by Charles V. Bennett and Robert J. Schroers. U. S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. Jan 1957. 28p photos, drawing, diagrs, graphs, tables. Order from OTS. 75 cents. PB 121788

Results of the tests indicate that impact resistance of the test unit varies linearly with fuel-cell material strength and energy-absorbing properties for materials of similar basic construction. The impact resistance of the test unit for fuel-cell

materials of equal strength is affected greatly by the construction of the fuel cell. CAA TDR 291.

Investigation of control "feel" effects on the dynamics of a piloted aircraft system. Goodyear Aircraft Corp., Akron, Ohio. Apr 1955. 62p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123710

The Goodyear Aircraft Corporation has conducted experiments under sponsorship of the Navy Bureau of Aeronautics to ascertain the dynamic characteristics of human operators performing a rate-control task continuously in one angular degree of freedom. This taks resembles control of pitch or roll attitudes of aircraft during critical phases, such as attack, landing, or formation flight. Geda analog computers and modern servomechanism concepts have been utilized in this work. GER-6726. NAVAER AE 61-10. Contract NOas-54-244c.

Simulation study of control of an aircraft at or near the absolute ceiling, by Alfred C. Robinson, James W. Early, and Bernard J. Doody. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Flight Control Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1956. 57p diagrs (part fold.), graphs (part fold.), table. Order from OTS. $1.50. PB 121459

A simulation study is made of each of four principal means of controlling and maintaining an aircraft at its absolute ceiling. The static and dynamic characteristics of each of these types of control are determined, and it is concluded that controls using airspeed information will probably be best for the purpose. The equations of motion applicable to ceiling flight were derived in WADC Technical Report 55-210 (PB 111991) published in May 1955. The present report covers the control system studies and presents the final conclusions. Project no. 5106. For earlier report under this project see PB 111991. AF WADC TR 56-39.

Instruments

Amplifier standardizing aircraft interphone equipment, by P. R. G. Verbeke. U. S. Naval Research Laboratory. Jun 1944. 15p photos, graphs. Order from LC. Mi $2.40, ph $3.30. PB 123392

Unclassified 15 Dec 1953.
1. Amplifiers, Interphone 2. NRL R-2326.

Automatic flight control systems for piloted aircraft, by K. G. Hart. Northrop Aircraft, Inc. Flight Control Systems Dept., Hawthorne, Calif. Apr 1956. 350p photos, diagrs, graphs, tables. Order from LC. Mi $11.10, ph $52.85. PB 123834

This volume is devoted primarily to design. The history of the development of automatic aircraft control is briefly described, along with a discussion of the general functions performed by present day automatic flight control systems. Basic components are described and their transfer functions are derived. A design procedure is recommended and its use is illustrated by an example. For volumes 1-3 see PB 113529, 109367 and 121073. Basic volume. NAVAER AE-61-4, vol. 6.

Development of a lightweight distance-measuring interrogator. U. S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I: The model DIB interrogator, by Carl C. Trout and Warren E. Haworth. Dec 1956. 34p photos, diagrs, graphs, tables. $1. PB 121789

This report describes the development of a lightweight distance-measuring interrogator, type DIB, for use in private and smaller commercial aircraft. This equipment contains only 23 vacuum tubes and has an installed weight of less than 25 pounds. The specification is included, along with a detailed description of the theory of operation of the equipment. Laboratory and flight tests are described, and the results in terms of performance and accuracy are included. CAA TDR 228.

Part II: The model DIC interrogator, by Carl C. Trout. Jan 1957. 38p photos, diagrs, graphs, tables. $1. PB 121787

The distance-measuring equipment described in this report is intended as a component part of the civil-military common system for air navigation and traffic control. It provides continuous indication of distance from a selected ground station. Typical performance data are presented, along with the results of tests made to determine compliance with the development specifications. Specification TD-125 is included as Appendix I. CAA TDR 292.

Effect of knob arrangement on consumption of panel space, by James V. Bradley. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory. Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1956. 13p diagrs, graphs. Order from OTS. 50 cents. PB 121518

This report presents relative likelihood of accidental operation as a function of panel space required for a number of multiple-knob arrangements. Data are derived from two previously reported experiments. Project no. 7152, Task 71514. AF WADC TR 56-202.

Flight test of an autopilot installation as a lateral gust alleviator in a PT-26 airplane, by Charles Chalk. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Mar 1956. 77p photo, drawings, diagrs, graphs, tables. Order from OTS. $2. PB 121244

The system consisted of Sperry A-12 autopilot components plus roll and yaw rate gyros, an aileron position pickup, and the special mixer circuit. The signal mixer permitted wide variation in magnitude and types of signals to the servos. Evaluation flights were made with the aileron servo inputs proportional to yawing angular velocity and aileron position. Project 1366, Task 70171. AF WADC TR 55-269.

Optimum knob diameter, by James V. Bradley and Jules Arginteanu. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1956. 23p drawing, graphs, tables. Order from OTS. 75 cents. PB 121852

It is important that controls should not be too small to be handled easily. On the other hand, precious panel space should not be wasted by using larger controls than those required for efficient operation. By using knobs of the smallest diameter for which operation time is minimal, both considerations will be served. The present experiment was designed, therefore, to determine the relationship between knob diameter and operation time, particular interest being centered upon that diameter, or range of diameters, at which operation time is a minimum. AD 110549. Project 7182, Task 71514. AF WADC TR 56-96.

UHF distance measuring equipment for air navigation, by R. C. Borden, C. C. Trout and E. C. Williams. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1950. 44p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122285

1. Distance measuring equipment 2. Navigation, Aerial - Equipment 3. Radio interrogators 4. Radar - Beacons, Transponder - Design 5. CAA TDR 114.

Wind-tunnel tests of full-scale radioplane aerial target missile XQ-1, by Joseph A. Ready. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1954. 154p photos, drawings (part fold), graphs (part fold), fold table. Order from LC. Mi $7.50, ph $24.30. PB 123112

Wind-tunnel tests of the Radioplane aerial target XQ-1 were requested after the target failed to meet the design performance in free-flight tests. The wind-tunnel tests were conducted during the period 31 August 1951 to 6 November 1951 in the 20-foot Massie Memorial Wind Tunnel. The data presented in this report are the results obtained from these tests. AD 71275. Project R-448-60. AF WADC TN WCLS 54-35.

Engines and Propellers

Calculation of steady longitudinal stresses arising from torsional deflection of a thin solid pretwisted propeller blade segment without and with rotation, by Francis R. Stone and John O. Schulze. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Propeller Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1953. 98p diagrs, graphs (1 fold.), tables. Order from LC. Mi $5.40, ph $15.30. PB 119907

Based on a combination of classical and simple torsional theory, the latter making the assumptions of retained planarity and parallelism of adjacent cross-sections, a derivation of equations for angular deflection and longitudinal stresses in pretwisted solid propeller blade sections is presented. The derivation is separated into the case of non-rotation (pure torque) and rotation (torque plus a type of axial load). Curves are presented showing the theoretical effect of varying values of pretwist and section chord on required torque moment, resulting angular deflection and longitudinal stress. No comparison is made to measured test data. AD 5003. AF WADC TR 53-20.

Design recommendations for fire protection of aircraft powerplant installations, by H. L. Hansberry. U. S. Civil Aeronautics Administration Technical Development and Evaluation Center, Indianapolis, Ind. Sep 1943. 20p drawings, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122270

1. Fire prevention - Engines, Aircraft 2. CAA TDN 31.

Investigation of a related series of turbine-blade profiles in cascade, by James C. Dunavant and John R. Erwin. U. S. National Advisory Committee for Aeronautics. Oct 1956. 100p diagrs, graphs, tables. Order as TN 3802 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124374

Supersedes RML 53G15.
1. Turbines, Axial - Flow 2. Cascades (Aerodynamic) - Tests 3. Turbines - Blades - Tests 4. NACA TN 3802.

Investigation of the use of hot gas ejectors for boundary layer control. Progress report no. 27

for the period 1 Dec to 1 Jan 1956 under Contract AF 33(616)-2178, by R. V. DeLeo. Minnesota. University. Institute of Technology. Department of Aeronautical Engineering. Rosemount Aeronautical Laboratories, Minneapolis, Minn. Jan 1956. 10p drawing, graphs. Order from LC. Mi $1.80, ph $1.80. PB 124953

An ejector installation was constructed which utilized the exhaust from a J-47 turbo jet engine for the primary or driving air. The facility will be used to obtain full scale operational data for typical tail pipe ejector installations. A schematic drawing is included. Tests were conducted over a range of mixing tubes lengths. Pumping and thrust performance was obtained. The report presents test results and cross plots of performance data. AD 82949.

Method for calculation of free-space sound pressures near a propeller in flight including considerations of the chordwise blade loading, by Charles E. Watkins and Barbara J. Durling. U. S. National Advisory Committee for Aeronautics. Nov 1956. 68p diagr, graphs, tables. Order as TN 3809 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124375

1. Equations, Integral 2. Noise, Propeller - Airplanes 3. Tables, Mathematical 4. NACA TN 3809.

Two-dimensional low-speed cascade investigation of NACA compressor blade sections having a systematic variation in mean-line loading, by John R. Erwin, Melvyn Savage and James C. Emery. U. S. National Advisory Committee for Aeronautics. Nov 1956. 129p diagrs, graphs, tables. Order as TN 3817 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124382

Supersedes RM L53130b.
1. Cascades (Aerodynamics) - Tests 2. Compressors, Axial - Blades - Tests 3. NACA TN 3817.

Airports and Airways

Mathematical study of the shearing stresses produced in a pavement by the locked wheels of an airplane during the warm-up of its engines, by Frank Baron. U. S. Civil Aeronautics Administration. Technical Evaulation and Development Center, Indianapolis, Ind. May 1947. 10p diagr, graphs. Order from LC. Mi $1.80, ph $1.80. PB 122265

1. Airports - Pavements - Stress-analysis 2. Engines, Aircraft - Vibration - Effect on pavements 3. CAA TDN 47.

Study on vibrations transmitted to pavements during warm-up periods of airplanes, by R. K. Bernhard. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Aug 1947. 54p photos, diagrs, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 122266

1. Engines, Aircraft - Vibration - Effect on pavements 2. Airports - Pavements - Stress analysis 3. CAA TDN no. 48.

Aerodynamics

Aerodynamic heating and heat transfer phenomena at Mach numbers 3 to 4, by K. G. Anderson, H. B. Merrell and J. M. Durben. Minnesota. University. Dept. of Aeronautical Engineering. Dec 1951. 114p photos, drawings, diagrs, graphs, tables. Order from OTS. $3. PB 121243

The heat transfer results showed reasonable agreement with theory for flat plate compressible flow. The recovery factors measured agreed well with measurements made by the NACA on a flat plate. In both heat transfer and recovery factor measurements, the transition region was well defined for the existing test conditions. It is concluded that the determination of this transition region for flight conditions is of great importance. Measurements of the temperature distribution in a boundary layer were made with an interferometer. Results of fair accuracy were obtained with this technique, but it is not considered sufficiently accurate to enable determination of small effects in the boundary layer, such as the variation in stagnation pressure. Project no. 1367, Task no. 61294. AF TR 5840. Contract AF 33(038)-10673.

Charts adapted from Van Driest's turbulent flat-plate theory for determining values of turbulent aerodynamic friction and heat-transfer coefficients, by Dorothy B. Lee and Maxime A. Faget. U. S. National Advisory Committee for Aeronautics. Oct 1956. 16p graphs, table. Order as TN 3811 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124377

1. Reynolds number - Effect 2. Mach number - Effect 3. Boundary layer, Turbulent - Heat transference - Theory 4. Airplanes - Skin - Friction - Theory 5. NACA TN 3811.

Comparison of theoretical stresses and deflections of multicell wings with experimental results obtained from plastic models, by George W. Zender. U. S. National Advisory Committee for Aeronautics. Nov 1956. 32p photos, diagrs. Order as NACA TN 3813 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124379

1. Wings - Stress analysis 2. Airplanes - Models, Plastic 3. NACA TN 3813.

Flight investigation of the stability and control characteristics of a vertically rising airplane research model with swept or unswept wings and x- or + -tails, by Robert H. Kirby. U. S. National Advisory Committee for Aeronautics. Oct 1956. 30p photos, drawings, diagrs, graphs. Order as TN 3812 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124378

1. Airplanes - Flight tests 2. Stability, Lateral - Dynamic tests 3. Stability, Longitudinal - Dynamic 4. NACA TN 3812.

Investigation of aerodynamic forces generated by a propeller in a compressible flow, by Paul Lieber, Koon-San Wan, and M. Spiegel. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1955. 302p diagrs, graphs, tables. Order from OTS. $5. PB 121462

This report is concerned with the calculation of unsteady aerodynamic forces generated by propellers operating at local high subsonic and supersonic velocities. A theory of such forces is developed and tables and charts are included from which the calculated periodic pressures generated by the subsonic and supersonic sections of three and four blade propellers may be obtained. The procedure for such calculations is illustrated by a numerical example in each case. Task no. 13466. AF WADC TR 55-312.

Investigation of the flow in the wake of a circular cylinder at Mach number 2.86, by E. J. Redman and L. W. Walter. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1954. 35p photos, drawing, graphs. Order from LC. Mi $3, ph $6.30. PB 124228

Pitot-pressure and static-pressure surveys were made across the wake of a circular cylinder of 1/2-in. diameter placed perpendicular to a flow of Mach number 2.86. It was found that a reasonably detailed streamline pattern, including the bow shock, could be constructed from the measurements. Total drag values were computed directly from the data using the momentum equation and were found to be about 20 percent lower than the drag obtained from surface pressure measurements. The major portion of this error was removed by taking account of the flow inclinations obtained from the streamline pattern. Complements NAVORD report 2854 (PB 120878). NAVORD 3705. NOL ARR 235.

On slender-body theory and the area rule at transonic speeds, by Keith C. Harder and E. B. Klunker. U. S. National Advisory Committee for Aeronautics. Nov 1956. 14p. Order as NACA TN 3815 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124381

1. Bodies of revolution - Theory 2. Flow, Transonic - Theory 3. Mach number - Effect 4. NACA TN 3815.

Survey of information on two-dimensional cascades, by Max J. Schilhansl. Brown University, Providence, R. I. Mar 1955. 177p diagrs, graphs. Order from LC. Mi $8.10, ph $27.30. PB 123984

All literature available to the author on subsonic two-dimensional straight and radial cascades were compiled and critically reviewed from the standpoint of the turbomachinery designer. It was found that for radial cascades only simple cases have been treated theoretically. There are many investigations on straight cascades treating the direct and inverse problem with approximate and rigorous methods. Compressibility effects have been referred to only in more recent papers. In experimental straight cascades work the rules to simulate two-dimensional flow in the cascade appear to be well established. The agreement between theory and experiments can be considered fair. Project no. 3066. AF WADC TR 54-322. Contract AF 33(616)-16.

Wind-tunnel investigation to determine the horizontal- and vertical-tail contributions to the static lateral stability characteristics of a complete-model swept-wing configuration at high subsonic speeds, by James W. Wiggins, Richard E. Kuhn and Paul G. Fournier. U. S. National Advisory Committee for Aeronautics. Nov 1956. 34p photo, drawing, diagrs, graphs. Order as TN 3818 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 124383

Supersedes RM L53E19.
1. Stability, Lateral - Effect of tail 2. Mach number - Effect 3. Airplanes - Models - Wind tunnel tests 4. NACA TN 3818.

Marine Transportation

Marine borer investigations. Annual report for the period Jan - Dec 1954 under Contract NOy-81879, by F. G. Walton-Smith. Miami. University. Marine Laboratory, Coral Gables, Fla. Mar 1955. 16p tables. Order from LC. Mi $2.40, ph $3.30. PB 124167

Report 55-17. ML 9546. Earlier research under Contract Nonr-705(00).
1. Marine borers - Effects of creosote 2. Marine borers - Physiology 3. Creosote - Toxicity 4. Contract NOy-81879.

Nylon webbing cargo nets. U. S. Naval Supply Research and Development Facility, Bayonne, N. J. Jul 1955. 57p photos, drawings, tables. Order from OTS. $1.50. PB 121810

The purpose was to develop a low cost nylon webbing net as an alternative to the presently specified nylon webbing cargo net, and to determine its acceptability for transfer-at-sea operations. Part 2 covers the technical evaluation of this net, indicates some of the variety of its possible uses, and, in particular, describes its unique application as flexible staging aboard aircraft carriers. Appendix A gives the result of satisfactory service performance tests aboard the USS Bennington. Samples attached in original copy. Contents: Part I. Development of low cost nylon webbing cargo nets. - Part II. Technical evaluation of the multi-purpose nylon webbing cargo net (Report no. 2: Engineering report no. 5.2071), by William J. Higgins and M. Toscano.

Oceanographic survey of the Gulf of Mexico. Annual report for period 30 Apr 1954 to 30 Apr 1955 under Contract N7 onr-487, T.O. II, by Dale F. Leipper. Texas. Agricultural and Mechanical College. Department of Oceanography, College Station, Texas. Jun 1955. 37p photos, maps, drawing, diagrs, graphs, table. Order from LC. Mi $3, ph $6.30. PB 124013

A & M Project 24. Reference 55-20A. For 1954 report see PB 118412.
1. Oceanography - Gulf of Mexico 2. Contract N7 onr-48702, T. O. II, NR 083-036.

Photoelastic studies of stresses in aircraft carrier bents, by H. B. Maris. U. S. Naval Research Laboratory. Aug 1940. 43p photos, fold diagrs. Order from LC. Mi $3.30, ph $7.80. PB 123293

Unclassified.
1. Aircraft carriers - Structure - Stress analysis
2. Doors - Stresses 3. NRL H 1644.

Propeller shaft torque fluctuations on the U. S. Tug WAHTAH. Part I, by W. C. Hall. U. S. Naval Research Laboratory. Mar 1941. 43p photos, graph, tables. Order from LC. Mi $3.30, ph $7.80. PB 123303

1. Torque, Propeller - Measurements 2. NRL O1706.

MISCELLANEOUS

Automation, a report on the technical trends and their impact on management and labour. Gt. Brit. Dept. of Scientific and Industrial Research. Mar 1956. 113p photos, diagrs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N Y. $1.08. PB 123650

S. O. code no. 47-194.
1. Production, Automatic - Gt. Brit. 2. Factory management- Effect of automation - Gt. Brit. 3. Labor and laboring classes - Effect of automation - Gt. Brit. 4. Data processing, Automatic - Gt. Brit.

Conditions of war limitation, by Stephen B. Jones. Yale University, New Haven, Conn. Nov 1955. 52p. Order from LC. Mi $3.60, ph $9.30. PB 124277

1. War - Limitation 2. Contract Nonr 1015(00), Technical report 5.

Report of NRL progress. U. S. Naval Research Laboratory. Mar 1957. 55p. Order from OTS. $1.25. Also available at annual subscription rate of $10 a year in the U. S. A., foreign rate $13 a year. PB 121904

Contents: Airborne laboratory for atmospheric electricity research, by J. H. Kraakevik and J. F. Clark. - Electroacoustic delay line, by W. G. Neubauer. - Model for use in tactical decision-making research, by H. Glaser and D. F. Wilson. - Scientific program: Problems accepted: Problem notes: Astronomy and astrophysics: Emissions from stellar radio sources Cassiopeia A, Tarus A, Omega Nebula, and Orion Nebula measured at 1.87 cm wavelength. . . . Experimental patrol of solar flare in preparation of IGY studies of the state of the chromosphere. . . . Electric field of a rotating magnet. - Electricity: On a theory which facilitates design and permits performance predictions of permanent-magnet generators. - Mathematics: Two theorems on the existence of hypoelastic potentials. - Mechanics: A new fracture-testing device. . . . "Transitions" in glazing materials for aircraft. . . . Larger version of the original NRL expendable breech high-speed gun, used for studying the penetration of small particles, fires projectiles at velocities up to 16,500 ft/sec. . . . Research and development of pulsejet gas turbine combustors for Naval use. - Metallurgy and ceramics: Delayed fracture bend test. . . . Use of aliphatic amino acids in cadmium baths to reduce hydrogen embrittlement. . . . Steady state creep through dislocation climb. . . . Corrosion products in ferrous systems. . . . Development of ion-exchange glass fiber paper. - Nuclear and atomic physics: Influence of field of view on measurements of atmospheric transmission. - Optics: An amplidyne power amplifier for use with chemical paper recorders. - Radio: Persistent target-like echoes in sea clutter studied with NRL's airborne radar and wave propagation laboratory. - Solid-state physics: Optical properties of solids. - Sound: An experimental study of butt-joined ADP crystal plates for sonar transducers. - Supporting techniques: Obsolete instrument adapted to read out the algebraic summations of five dc signals on a standard type dial. . . . A method for applying stable, uniform resistive coatings within 5 percent of a required value. . . . Novel way of applying transparent conductive coatings onto the interior surfaces of electron tubes of complex geometries. - Published reports. - Papers by NRL staff members. - Patents.

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Biology and Medicine

Biological effects of blast from bombs. Glass fragments as penetrating missiles and some of the biological implications of glass fragmented by atomic explosions. Progress report, by I. Gerald Bowen, Donald R. Richmond, Mead B. Wetherbe, and Clayton S. White. Lovelace Foundation for Medical Education and Research, Albuquerque, New Mex. Jun 1956. Contract AT(29-1)-1242. 47p. Order from OTS. 35 cents. AECU-3350

Biological and medical research division quarterly report July, August, September, 1956. Argonne National Lab., Lemont, Ill. Dec 1956. Contract W-31-109-eng-38. 141p. Order from OTS. 70 cents. ANL-5655

High density concrete shielding test, by T. H. J. Burnett. Oak Ridge National Lab., Tenn. Dec 1949. Changed from Official Use Only Oct 3, 1956. Contract W-7405-eng-26. 18p. Order from LC. Mi $2.40, ph $3.30. CF-49-12-75

Radiation control at the Savannah River Laboratory, by G. M. Nichols. E. I. du Pont de Nemours & Co. Savannah River Laboratory. Nov 1956. Contract AT(07-2)-1. 15p. Order from OTS. 20 cents. DP-186

Gastrointestinal absorption, distribution, and retention of phosphorus (P^{32}) by rats following feeding in various forms, by B. Kawin and R. F. Palmer. Hanford Atomic Products Operation, Richland, Wash. Jun 1956. Contract W-31-109-eng-52. 23p. Order from LC. Mi $2.70, ph $4.80. HW-43836

Determination of radioactive fall-out, by J. J. Fitzgerald. Knolls Atomic Power Lab., Schenectady, N. Y. Feb 1956. Contract W-31-109-eng-52. 25p. Order from OTS. 25 cents. KAPL-1439

Resonance-threshold foil neutron personnel dosimeter, by J. J. Fitzgerald and C. G. Detwiler. Knolls Atomic Power Lab., Schenectady, N. Y. Jun 1956. Contract W-31-109-eng-52. 35p. Order from OTS. 30 cents. KAPL-1516

Health Physics report for July, August, September 1956, by L. J. Cherubin. Knolls Atomic Power Lab., Schenectady, N. Y. Feb 1957. Contract W-31-109-eng-52. 35p. Order from OTS. 30 cents. KAPL-1689

The effects of repeated polonium injections on rats: I. Gross effects and metabolism of 2 uC/Kg doses, by R. K. Davis, W. T. Rockhold, and D. S. Anthony. Mound Laboratory, Monsanto Chemical Co., Miamisburg, Ohio. Apr 1954. Contract AT-33-1-gen-53. 31p. Order from OTS. 25 cents. MLM-961

Neutron scattering, by John Wilder Cure, III. Oak Ridge National Lab., Oak Ridge, Tenn. Jan 1956. Contract W-7405-eng-26. 34p. Order from OTS. 30 cents. ORNL-2013

Medical and Health Physics quarterly report July, August, September 1956. University of Calif. Radiation Lab., Berkeley, Calif. Nov 1956. Contract W-7405-eng-48. 21p. Order from OTS. 25 cents. UCRL-3573

The fate of polonium ^{210} colloid and polonium^{210} tagged silver particles following intratracheal administration to rabbits, by P. E. Morrow and R. J. Della Rosa. Rochester, N. Y. Univ. Atomic Energy Project. Nov 1956. Contract W-7401-eng-49. 23p. Order from LC. Mi $2.70, ph $4.80. UR-478

Effects of nuclear explosions on frozen foods, by H. P. Schmitt. Food and Drug Administration Dept. of Health, Education and Welfare,

Washington, D. C., and Federal Civil Defense Administration, Battle Creek, Mich. Jan 1957. Project 32.5 of Operation Teapot. 17p. Order from OTS. 20 cents. WT-1215

Chemistry and Chemical Engineering

Recovery of uranium from wet process phosphoric acid. Final report, by Patrick J. Quinn. Armour Fertilizer Works, Bartow, Fla. Oct 1954. Decl. with deletions May 31, 1956. Contract AT(49-1)-532. 40p. Order from LC. Mi $3, ph $6.30. AECD-3738

Attritioning of Temple Mountain ore, by J. N. Butler, R. W. Stephens, and H. P. Ehrlinger, III. Nevada. Univ., Reno. Mackay School of Mines. Jun 1953. Changed from Official Use Only Jun 21, 1956. Contract AT(49-1)-624. 26p. Order from LC. Mi $2.70, ph $4.80. AECD-3866

Recovery of uranium from beta salvage residues by vapor phase chlorination with CCl_4, by R. W. Veatch, Jr. and A. J. Miller. Tennessee Eastman Corp., Oak Ridge, Tenn. Apr 1946. Decl. Jan 30, 1956. Contract W-7401-eng-23. 9p. Mi $1.80, ph $1.80. AECD-4173

Radiation resistant greases, by R. O. Bolt, J. G. Carroll, B. W. Hotten, and S. R. Calish. Calif. Research Corp., Richmond, Calif. Jun 1956. Contract AT(11-1)-174. 42p. Order from OTS. 35 cents. AECU-3148

Determination of hydrogen in sodium-potassium alloy, by O. C. Simpson and E. G. Rauh. Argonne National Lab., Lemont, Ill. Dec 1946. Decl. Feb 16, 1956. Contract W-31-109-eng-38. 12p. Order from LC. Mi $2.40, ph $3.30. CF-3748

Continuous ion exchange column investigations, by S. H. Jury. Oak Ridge National Lab., Tenn. Aug 1950. Changed from Official Use Only Oct 3, 1956. Contract W-7405-eng-26. 14p. Order from LC. Mi $2.40, ph $3.30. CF-50-9-80

HRP-hydraulic cyclone study for liquid-solid separation, P. A. Haas, E. O. Hurmi, M. E. Whatley, and J. R. Engel. Oak Ridge National Lab., Tenn. Aug 1956. Contract W-7405-eng-26. 19p. Order from LC. Mi $2.40, ph $3.30. CF-56-8-132

Density and viscosity of solutions in the tributyl phosphate process for uranium recovery, by L. L. Burger and C. M. Slansky. Hanford Works, Richland, Wash. Nov 1949. Decl. Apr 23, 1956. Contract W-31-109-eng-52. 7p. Order from LC. Mi $1.80, ph $1.80. HW-15233

Liquid-vapor equilibrium in the system nitric acid-water-trace fluoride, by Robert Lee Moore. Hanford Atomic Products Operation, Richland, Wash. Jan 1957. Contract W-31-109-eng-52. 15p. Order from OTS. 20 cents. HW-47813

Supplement no. 1 to manual of the analytical methods used by the control laboratory at the chemical processing plant. Parts I and II, by M. J. Shepherd, Jr. and J. E. Rein. Atomic Energy Division. Phillips Petroleum Co., Idaho Falls, Idaho. Nov 1956. 156p. Order from OTS. $1. IDO-14316(Suppl. 1)

A multicurie facility for high level chemical process research, by R. D. Fletcher and C. M. Slansky. Atomic Energy Division. Phillips Petroleum Co., Idaho Falls, Idaho. Sep 1956. Contract AT(10-1)-205. 41p. Order from OTS. 30 cents. IDO-14386

Separation of nitrate and aluminum from radioactive chemical wastes, by John B. Huff. Atomic Energy Division. Phillips Petroleum Co., Idaho Falls, Idaho. Jan 1957. 16p. Order from OTS. 20 cents. IDO-14392

I. Direct titration of sulfate. II. High precision spectrophotometric analysis, by Max Q. Freeland and J. S. Fritz. Ames Laboratory. Iowa State College, Ames, Iowa. Nov 1955. Contract W-7405-eng-82. 64p. Order from OTS. 40 cents. ISC-667

Semi-annual summary research report in chemistry for January - June, 1956. Ames Laboratory. Iowa State College, Ames, Iowa. Oct 1956. Contract W-7405-eng-82. 61p. Order from OTS. 40 cents. ISC-757

A brief guide to UF_6 handling, by J. W. Arendt, E. W. Powell, and H. W. Saylor. Oak Ridge Gaseous Diffusion Plant. Union Carbide Nuclear Co., Oak Ridge, Tenn., and Paducah, Ky. Feb 1957. Contract W-7405-eng-26. 25p. Order from OTS. 25 cents. K-1323

Selected methods of chemical analysis for Thorex process control, by W. W. Sabol and B. F. Rider. Knolls Atomic Power Lab., Schenectady, N. Y. Sep 1956. Contract W-31-109-eng-52. 67p. Order from OTS. 45 cents. KAPL-1477

Monthly technical report for the period May 1 through May 31, 1945, by W. B. Burford, III. Johns Hopkins Univ., Baltimore. Decl. Jan 7, 1956. Contract W-7401-eng-43. 15p. Order from LC. Mi $2.40, ph $3.30. M-2126

Monthly technical report for period August 1, through August 31, 1945, by W. B. Burford, III. Johns Hopkins Univ., Baltimore. Decl. Jan 30, 1956. Contract W-7401-eng-43. 12p. Order from LC. Mi $2.40, ph $3.30. M-2132

Spectrographic determination of impurities in zirconium, by John A. Norris. Massachusetts Inst. of Tech., Cambridge. Jun 1950. Changed from Official Use Only June 20, 1956. Contract W-7405-eng-175. 45p. Order from LC. Mi $3, ph $6.30. MIT-1049

Heterogeneous catalysis of hydrogen peroxide decomposition. Problem Assignment no. CX5-1, by J. P. Hunt, G. L. Johnson, and D. E. Koshland, Jr. Clinton Labs., Oak Ridge, Tenn. Jun 1946. Decl. Jan 26, 1956. Contract W-35-058-eng-71. 11p. Order from LC. Mi $2.40, ph $3.30. MonN-119

Pyrometallurgical processes for thorium-uranium fuel. Semiannual progress report January-June, 1956, by A. G. Buyers and E. E. Motta. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 1957. Contract AT-11-1-gen-8. 34p. Order from OTS. 30 cents. NAA-SR-1710

The behavior of tetralin in liquid sodium, by R. L. McKisson and K. E. Horton. Atomics Internationa. Division of North American Aviation, Inc., Canoga Park, Calif. Feb 1957. Contract AT(04-3)-49. 19p. Order from OTS. 20 cents. NAA-SR-1771

Metal—water explosions, by W. C. Ruebsamen and J. B. Chrisney. North American Aviation, Inc., Downey, Calif. Jul 1951. Changed from Official Use Only June 22, 1956. 9p. Order from LC. Mi $1.80, ph $1.80. NAA-SR-Memo-75

Problems of leaching and digestion of uraniferous slags and alloys. Progress report no. 15 for August 1952, by H. Fleck and John E. Summers. Vitro Mfg. Co., Pittsburgh. Aug 1952. Decl. Nov 13, 1956. Contract AT(30-1)-1241. 11p. Order from LC. Mi $2.40, ph $3.30. NYO-1149

Problems of refining uraniferous residues. Progress report no. 27 for July 1953, by H. Fleck and John E. Summers. Vitro Mfg. Co., Pittsburgh. Aug 1953. Decl. Nov 13, 1956. Contract AT(30-1)-1241. 12p. Order from LC. Mi $2.40, ph $3.30. NYO-1163

Bibliography of deuterium separation methods, by William P. Drews. Standard Oil Development Co. Esso Labs., Linden, N. J. Dec 1953. Decl. Oct 28, 1955. 65p. Order from LC. Mi $3.90, ph $10.80. NYO-6084

Electrochemical studies of non-aqueous melts. Quarterly progress report for period ending June 1, 1956, by R. F. Mehl and G. Derge. Metals Research Laboratory. Carnegie Institute of Technology, Pittsburgh, Pa. Jun 1956. Contract AT(30-1)-1024. 8p. Order from OTS. 15 cents. NYO-6623

The preparation and evaluation of superior flocculating agents for phosphate slimes. Progress report of work from August 1, 1955—August 31, 1956, by Victor K. LaMer, Robert H. Smellie, Jr., Pui-Kum Lee, and K. Ramamurti. Columbia Univ., New York, N. Y. Oct 1956. Contract AT(30-1)-1189. 28p. Order from OTS. 25 cents. NYO-7403

Final report for July 5, 1949 to October 31, 1949. Ionics, Inc., Cambridge, Mass. Oct 1949. Changed from Official Use Only Aug 24, 1956. Contract AT(30-1)-665. 8p. Order from LC. Mi $1.80, ph $1.80. NYOO-1450

Progress report for July 5, 1949 to September 26, 1949. Ionics, Inc., Cambridge, Mass. Oct 1949. Changed from Official Use Only Aug 10, 1956. Contract AT(30-1)-665. 47p. Order from LC. Mi $3.30, ph $7.80. NYOO-1451

Demineralization (807) building operating manual, by E. M. Shank and L. L. Fairchild. Oak Ridge National Lab., Tenn. Nov 1950. Changed from Official Use Only Oct 3, 1956. Contract W-7405-eng-26. 98p. Order from LC. Mi $5.40, ph $15.30. ORNL-647

Determination of chloride in zirconium metal, by P. F. Thomason and M. T. Kelley. Oak Ridge National Lab., Tenn. Aug 1950. Decl. Oct 3, 1956. Contract W-7405-eng-26. 8p. Order from LC. Mi $1.80, ph $1.80. ORNL-747

Explosion and detonation properties of mixtures of hydrogen, oxygen, and water vapor, by T. H. Pigford. Oak Ridge National Lab., Tenn. Aug 1952. Decl. Dec 13, 1956. Contract W-7405-eng-26. 92p. Order from LC. Mi $5.40, ph $15.30. ORNL-1322

The buildup of heavy isotopes during thermal neutron irradiation of uranium reactor fuels, by J. O. Blomeke. Oak Ridge National Lab. Union Carbide Nuclear Co., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 58p. Order from OTS. 40 cents. ORNL-2126

Progress report: Further studies of the dialkylphosphoric acid extraction (Dapex) process for uranium, by C. A. Blake, D. J. Crouse, C. F. Coleman, K. B. Brown, and A. D. Kelmers. Oak Ridge National Lab. Union Carbide Nuclear Co., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 113p. Order from OTS. 65 cents. ORNL-2172

Progress report on separation and recovery of uranium and thorium from sulfate liquors by the Amex process, by D. J. Crouse, K. B. Brown, and W. D. Arnold. Oak Ridge National Lab. Union Carbide Nuclear Co., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 37p. Order from OTS. 30 cents. ORNL-2173

Determination of microgram quantities of carbon by low-pressure combustion, by J. H. Edgerton and H. G. Davis. Oak Ridge National Lab. Union Carbide Nuclear Co., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 9p. Order from OTS. 20 cents. ORNL-2211

Stable isotopes division semiannual progress report for period ending November 30, 1956, by C. P. Keim and J. R. McNally, Jr. Oak Ridge National Lab. Union Carbide Nuclear Co., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 53p. Order from OTS. 40 cents. ORNL-2236

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Development of fluid-sampling facilities for use in conjunction with process facilities at U. S. A. E. site, by William Mack and John Irwin. Foster Wheeler Corp., New York. Apr 1951. Changed from Official Use Only June 20, 1956. 74p. Order from LC. Mi $4.50, ph $12.30. TID-5030

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Fundamentals of glass-to-metal bonding. VI. Further exploratory studies on the pressure dependence of the wettability of platinum by sodium silicate glass. Technical progress report no. 6, by Milton L. Volpe, Richard M. Fulrath, and Joseph A. Pask. California. Univ., Berkeley, Minerals Research Lab. Aug 1956. Contract AT(11-1)-34. 21p. Order from LC. Mi $2.70, ph $4.80. AECU-3380

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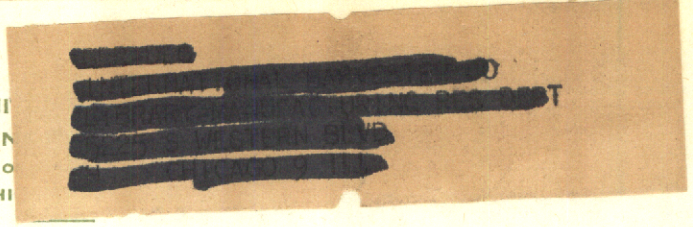

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